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ABSTRACT

The National Assessment of Educational Progress (NAEP) has measured students' progress toward higher achievement since 1969, assessing students in public and nonpublic schools in various subject areas on a regular basis. The NAEP has also collected background information about students to provide a context for interpreting assessment results and documenting the implementation of educational reform. This addendum is a revision and full reprint of sections of the report: (1) the Executive Summary; (2) Chapter 1; (3) Chapter 2; and (4) Appendix A of "NAEP 1996 Trends in Academic Progress" (NCES 97-985). It contains revisions to the text, tables, and figures of the Long Term Trend Science results. The material in this addendum replaces the corresponding sections of the original report. The original report presented the results of science, mathematics, reading, and writing trend assessment, charting them back to the year in which the assessment was first given. Trends are discussed for students at ages 9, 13, and 17, in grades 4, 8, and 11. Trends in average performance differences between White and Black, White and Hispanic, and male and female students are also discussed. The overall pattern of science performance has been one of decline followed by recent improved performance. The long-term science trend assessment contains a content dimension and a cognitive dimension. Because it represents educational objectives that were established in 1969 for 17-year-olds and 1970 for 9- and 13-year-olds, the long-term science trend assessment may represent a more constrained view than the 1996 main science assessment, as this addendum clarifies. (Contains 9 figures and 18 tables.) (SLD)

ED 424 269

NATIONAL CENTER FOR EDUCATION STATISTICS

NAEP 1996 Trends in Academic Progress

Addendum

Achievement of U.S. Students in

• Science, 1969 to 1996 • Mathematics, 1973 to 1996

• Reading, 1971 to 1996 • Writing, 1984 to 1996

REVISED
August 1998

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What is The Nation's Report Card?

THE NATION'S REPORT CARD, the National Assessment of Educational Progress (NAEP), is the only nationally representative and continuing assessment of what America's students know and can do in various subject areas. Since 1969, assessments have been conducted periodically in reading, mathematics, science, writing, history/geography, and other fields. By making objective information on student performance available to policymakers at the national, state, and local levels, NAEP is an integral part of our nation's evaluation of the condition and progress of education. Only information related to academic achievement is collected under this program. NAEP guarantees the privacy of individual students and their families.

NAEP is a congressionally mandated project of the U.S. Department of Education's National Center for Education Statistics. The Commissioner of Education Statistics is responsible, by law, for carrying out the NAEP project through competitive awards to qualified organizations. NAEP reports directly to the commissioner, who is also responsible for providing continuing reviews, including validation studies and solicitation of public comment, on NAEP's conduct and usefulness.

In 1988, Congress established the National Assessment Governing Board (NAGB) to formulate policy guidelines for NAEP. The Board is responsible for selecting the subject areas to be assessed from among those included in the National Education Goals; for setting appropriate student performance levels; for developing assessment objectives and test specifications through a national consensus approach; for designing the assessment methodology; for developing guidelines for reporting and disseminating NAEP results; for developing standards and procedures for interstate, regional, and national comparisons; for determining the appropriateness of test items and ensuring that they are free from bias; and for taking actions to improve the form and use of the National Assessment.

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NAEP 1996 Trends in Academic Progress

Addendum

Achievement of U.S. Students in

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August 1998

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This addendum is a revision and full reprint of the Executive Summary, Chapter 1, Chapter 2, and Appendix A of ***NAEP 1996 Trends in Academic Progress*** (NCES 97-985). It contains revisions to the text, tables and figures of the Long Term Trend Science results. The material in this addendum replaces the corresponding sections in the original report.

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Executive Summary

Introduction

As we approach the year 2000, efforts to increase the academic achievement of students and to prepare them for the 21st century have become a primary focus of parents, educators, and policy makers. During the 1990s, educational reform and increased expectations for all students to achieve their highest potential have been the hallmark of policies and programs set forth at the national, state, and district levels. In 1990, the President and governors adopted a set of six ambitious national education goals for the 21st century: ensuring that children start school ready to learn, raising high school graduation rates, increasing levels of education achievement, promoting science and mathematics achievement as well as literacy and lifelong learning, and freeing schools of drugs and violence.[1] Congress broadened these goals in 1994 to include improvements in teacher preparation and increased parental involvement in schools.[2] In 1997, the President strengthened the nation's commitment to rigorous education standards by proposing a voluntary program of national tests in reading at grade 4 and in mathematics at grade 8 to ensure that individual students across the country are provided equal opportunities to achieve high standards in these critical subject areas.

As new policies are implemented and changes in educational practices occur, information about trends in student achievement across time is critical for educators and policy makers to observe the overall effects of reform efforts. Measuring students' progress toward higher achievement has been the purpose of the National Assessment of Educational Progress (NAEP) since its inception in 1969. Students in both public and nonpublic schools have been assessed in various subject areas on a regular basis. In addition, NAEP collects information about relevant background variables that provide a meaningful context for interpreting the assessment results and for documenting the extent to which educational reform has been implemented.

The NAEP Long-Term Trend Assessments

One important feature of NAEP is its ability to document trends in academic achievement in core curriculum areas over an extended period of time. By readministering materials and replicating procedures from assessment to assessment, NAEP collects valuable information about progress in academic achievement and about whether the United States can meet the challenge of its national education goals.

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[1] Executive Office of the President. (1990). *National goals for education.* Washington, DC: U.S. Government Printing Office.

[2] Goals 2000: Educate America Act, Pub. L. No. 102-227 (1994).

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The NAEP long-term trend assessments are separate from a series of newer NAEP assessments (called "main" assessments) that involve more recently developed instruments. While the long-term trend assessments have used the same sets of questions and tasks so that trends across time can be measured, the main assessments in each subject area have been developed to reflect current educational content and assessment methodoloy. In some cases, the main assessment in a particular subject area has been administered in more than one year, providing short-term trend results (e.g., mathematics in 1990, 1992, and 1994; and reading in 1992 and 1994). The use of both long-term trend and main assessments allows NAEP to provide information about students' achievement over time and to evaluate their attainment of more contemporary educational objectives. As each assessment is based on a different set of questions and tasks, scale score results and students' reports of educationally related experiences from the long-term trend assessments cannot be directly compared to the main assessments.

The following sections of this report present the results of the science, mathematics, reading, and writing trend assessments. These results chart trends going back to the first year in which each NAEP assessment was given: 1969/1970 in science, 1973 in mathematics, 1971 in reading, and 1984 in writing. Trends in average performance over these time periods are discussed for students at ages 9, 13, and 17 for the science, mathematics, and reading assessments, and for students in grades 4, 8, and 11 for the writing assessment. Trends in average performance differences between White students and Black students, White students and Hispanic students, and male and female students are also discussed.

Analysis Procedures

To provide a numeric summary of students' performance on assessment questions and tasks, NAEP uses a 0-to-500 scale for each subject area. Comparisons of average scale scores are provided across the years in which trend assessments have been administered and among subpopulations of students. Nationally representative samples totaling approximately 30,000 students were involved in the NAEP 1996 trend assessments.

The descriptions of trend results are based on the results of statistical tests that consider both the estimates of average performance in each assessment year as well as the degree of uncertainty associated with these estimates. The purpose of basing descriptions on such tests is to restrict the discussion of observed trends and group differences to those that are statistically dependable. Hence, the patterns of results that are discussed are unlikely to be due to the chance factors associated with the inevitable sampling and measurement errors inherent in any large-scale survey effort like NAEP. Throughout this report, all descriptions of trend patterns, differences between assessment years, and differences between subgroups of students which are cited are statistically significant at the .05 level.

Two distinct sets of statistical tests were applied to the trend results. The purpose of the first set of tests was to determine whether the results of the series of assessments in a given subject could be generally characterized by a line or a simple curve. Simple linear and curvilinear (or quadratic) patterns do not always provide a satisfactory summary description of

the patterns of trend results. Hence, a second set of statistical tests were conducted which compared results for selected pairs of assessment years within each trend sequence. Two families of pairwise tests were carried out. One family of tests consisted of comparing the results from the first assessment year (base year) to the 1996 results. The second family of tests consisted of comparing the results from the previous assessment year (1994) to the 1996 results. It should be noted that statistically significant changes in student performance across a two-year period may be unlikely, and in fact, are not evident in the overall results or in the results for most subgroups of students presented in this report. Changes in the average achievement of populations or subpopulations are more likely to occur over extended periods of time. In addition, the inherent uncertainty associated with estimates of performance based on samples rather than entire populations necessitates consideration of standard errors in comparing assessment results, further constraining the likelihood that the magnitude of change which may occur between two years will be statistically significant. The characterizations of trend data that appear in the executive summary and in the following chapters of this report are based on the combined results of both the general tests and the two families of pairwise tests.

The results of each type of statistical test are presented in small grids that appear next to or below each of the figures in this report that display data for each assessment year. The results from tests comparing the base year and 1996 assessments are summarized in the column labeled with the asterisk symbol "*." Significant differences are denoted with a "+" or "-" sign indicating that the 1996 average score was either greater than or less than the base year score, respectively. Similarly, significant differences between 1994 and 1996 assessment results are denoted with a "+" or "-" sign under the column labeled with the dagger symbol "†" indicating that the 1996 average score was either greater or smaller than the 1994 average, respectively. The results from the linear and quadratic trend tests are summarized in the columns labeled "L" and "Q," respectively. Within each column, significant positive trends are denoted by a "+" sign and significant negative trends are denoted with a "-" sign. In tables where only the first and most recent assessment results are presented, significant differences between the base year and 1996 are indicated within the tables.

National Trends in Average Scale Scores

The national trends in science, mathematics, reading, and writing achievement are presented in Figure 1. In general, the trends in science and mathematics show early declines or relative stability followed by improved performance. In reading and writing, the results are somewhat mixed; although some modest improvement was evident in the trend reading assessments, few indications of positive trends were evident in the writing results.

Science. The overall pattern of performance in science for 9-, 13-, and 17-year-olds is one of early declines followed by a period of improvements. Among 17-year-old students, declines in performance that were observed from 1969 to 1982 were reversed, and the trend has been toward higher average science scores since that time. Despite these recent gains, the 1996 average score remained lower than that in 1969. After a period of declining performance from 1970 to 1977, the trend for 13-year-olds has been one of increasing scores. Although the overall linear trend was positive, there was no significant difference between the 1996 and

1970 average scores for these students. Except for the decline from 1970 to 1973 in average science scores for 9-year-olds, the overall trend shows improved performance, and the 1996 average score for these students was higher than that in 1970.

Mathematics. At all three ages, trend results indicate overall improvement in mathematics across the assessment years. Among 17-year-olds, declining performance during the 1970s and early 1980s was followed by a period of moderate gains. Although the overall pattern is one of increased performance, the average score in 1996 was not significantly different from that in 1973. The performance of 13-year-olds across the trend assessments shows overall improvement, resulting in a 1996 average score that was higher than the 1973 average. After a period of relative stability during the 1970s and early 1980s, 9-year-olds demonstrated improved performance. The overall trend for this age group was one of improved performance, and the average score in 1996 was higher than that in 1973.

Reading. At age 17, the pattern of increases in average reading scores from 1971 to 1988 was not sustained into the 1990s. Although the overall pattern is one of improved performance across the assessment years, the average score of 17-year-olds in 1996 was not significantly different from that of their counterparts in 1971. Thirteen-year-olds have shown moderate gains across the trend assessments, and in 1996 attained an average score that was higher than that in 1971. The performance of 9-year-olds improved from 1971 to 1980, but declined slightly since that time. However, in 1996 the average score for these students remained higher than that of their counterparts in 1971.

Writing. Among eleventh graders, an overall pattern of declining performance is evident in the average writing scores across the assessment years. In 1996, the average score attained by these students was lower than that in 1984. The average writing score of eighth graders has fluctuated, reaching a low point in 1990 and rebounding in 1992. However, no consistent pattern of increases or decreases across the assessments was evident, and the 1996 average score for these students did not differ significantly from that of their counterparts in 1984. At grade 4, no significant changes were observed in students' average writing scores from 1984 to 1996.

Figure 1 Trends in Average Scale Scores for the Nation

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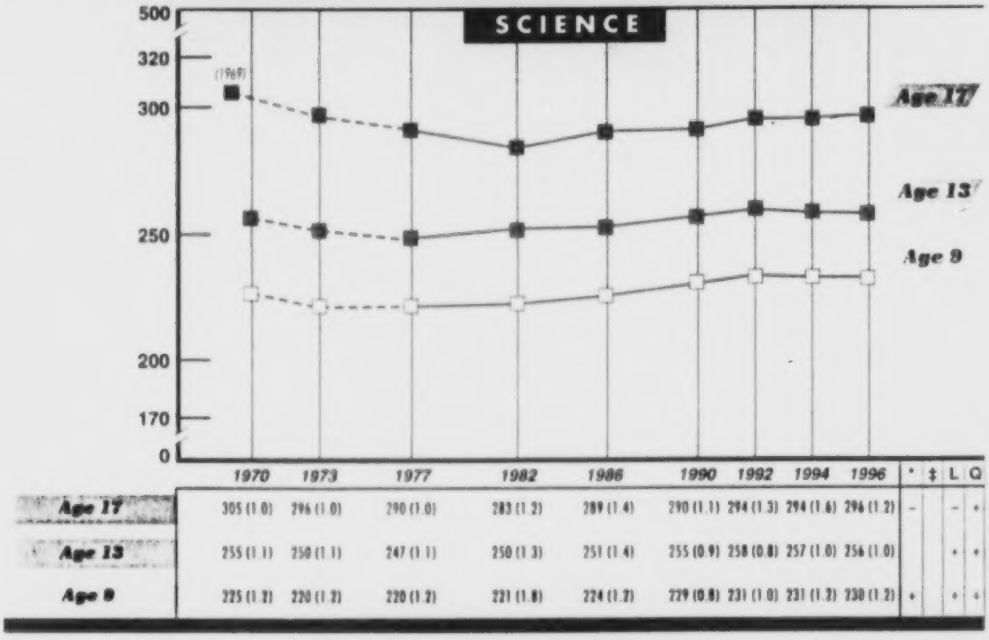
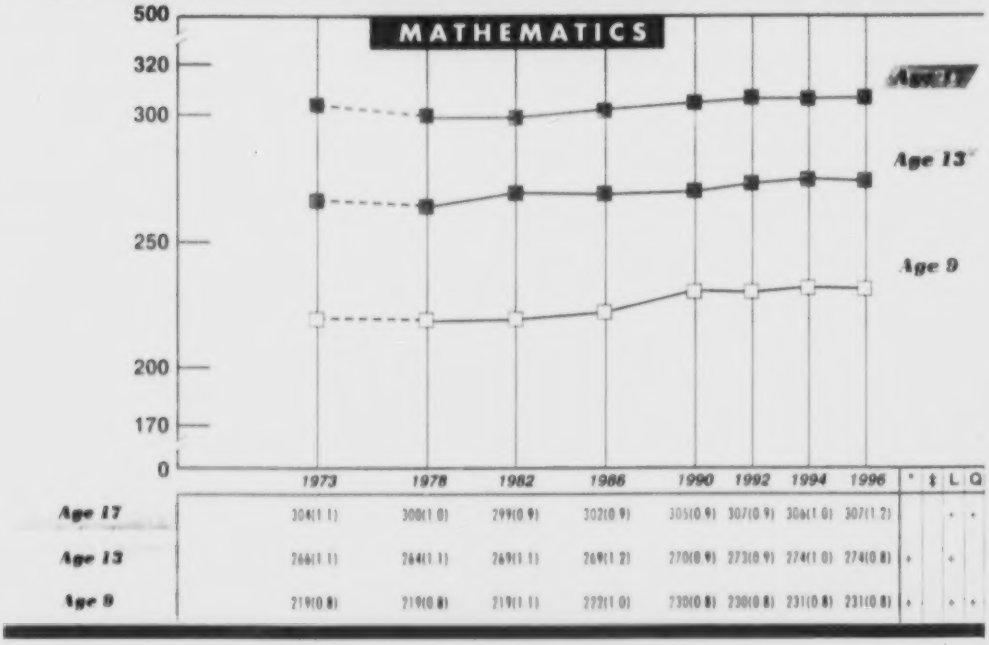


	1970	1973	1977	1982	1986	1990	1992	1994	1996	*	‡	L	Q
Age 17	305 (1.0)	296 (1.0)	290 (1.0)	283 (1.2)	289 (1.4)	290 (1.1)	294 (1.3)	294 (1.6)	296 (1.2)	–		–	+
Age 13	255 (1.1)	250 (1.1)	247 (1.1)	250 (1.3)	251 (1.4)	255 (0.9)	258 (0.8)	257 (1.0)	256 (1.0)			+	+
Age 9	225 (1.2)	220 (1.2)	220 (1.2)	221 (1.8)	224 (1.2)	229 (0.8)	231 (1.0)	231 (1.2)	230 (1.2)	+		+	+



	1973	1978	1982	1986	1990	1992	1994	1996	*	‡	L	Q
Age 17	304(1.1)	300(1.0)	299(0.9)	302(0.9)	305(0.9)	307(0.9)	306(1.0)	307(1.2)			+	+
Age 13	266(1.1)	264(1.1)	269(1.1)	269(1.2)	270(0.9)	273(0.9)	274(1.0)	274(0.8)	+		+	
Age 9	219(0.8)	219(0.8)	219(1.1)	222(1.0)	230(0.8)	230(0.8)	231(0.8)	231(0.8)	+		+	+

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Figure 1 (continued)

Trends in Average Scale Scores for the Nation

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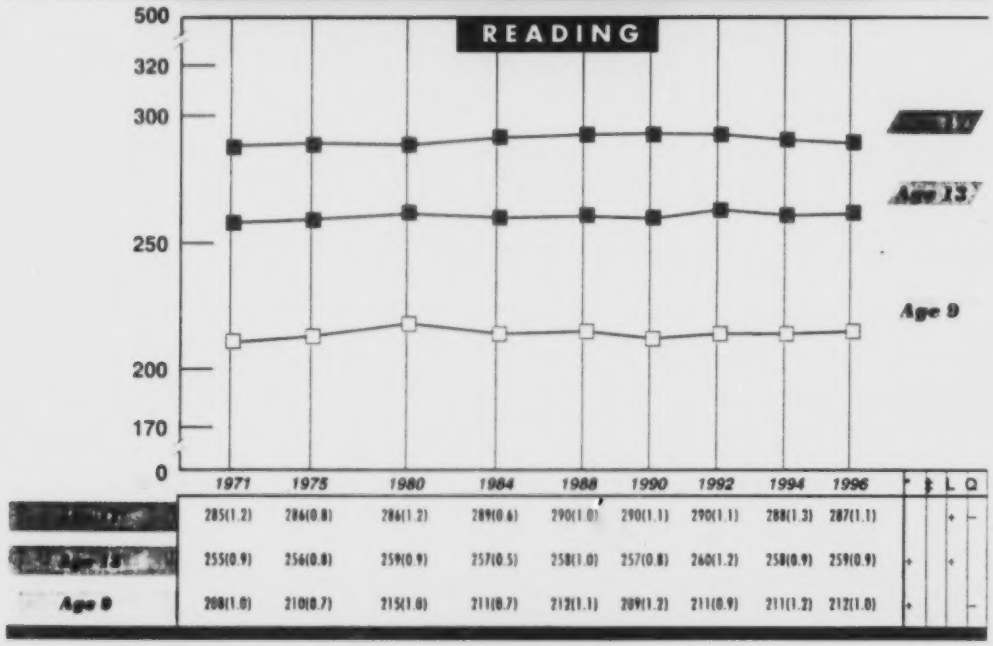
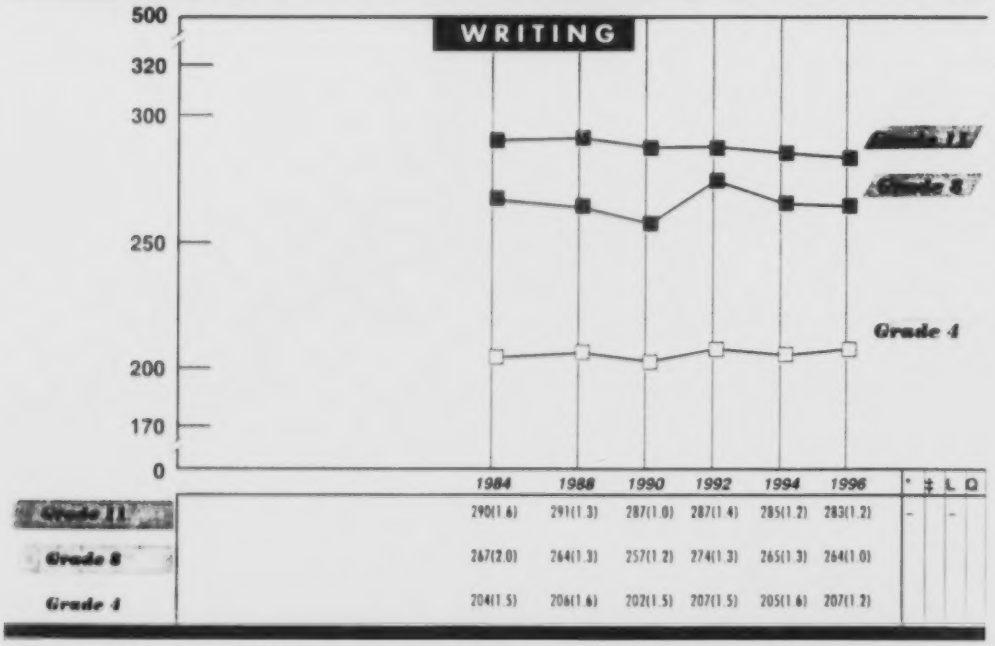


	1971	1975	1980	1984	1988	1990	1992	1994	1996	*	‡	L	Q
[illegible]	285(1.2)	286(0.8)	286(1.2)	289(0.6)	290(1.0)	290(1.1)	290(1.1)	288(1.3)	287(1.1)			+	–
[illegible]	255(0.9)	256(0.8)	259(0.9)	257(0.5)	258(1.0)	257(0.8)	260(1.2)	258(0.9)	259(0.9)	+		+	
Age 9	208(1.0)	210(0.7)	215(1.0)	211(0.7)	212(1.1)	209(1.2)	211(0.9)	211(1.2)	212(1.0)	+			–



	1984	1988	1990	1992	1994	1996	*	‡	L	Q
[illegible]	290(1.6)	291(1.3)	287(1.0)	287(1.4)	285(1.2)	283(1.2)	–		–	
[illegible]	267(2.0)	264(1.3)	257(1.2)	274(1.3)	265(1.3)	264(1.0)				
Grade 4	204(1.5)	206(1.6)	202(1.5)	207(1.5)	205(1.6)	207(1.2)				

Standard errors of the estimated scale scores appear in parentheses. [– – –] Extrapolated from previous NAEP analyses.

* Indicates that the average scale score in 1996 is significantly larger (+) or smaller (–) than that in the first assessment year.

‡ Indicates that the average scale score in 1996 is significantly larger (+) or smaller (–) than that in 1994.

L Indicates that the positive (+) or negative (–) linear trend is significant.

Q Indicates that the positive (+) or negative (–) quadratic trend is significant.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Trends in Levels of Performance

A more in-depth understanding of students' academic progress across time can be gained by examining the types of abilities associated with different levels on the NAEP scale and the percentages of students who have attained those levels of performance across the trend assessments. Five levels of performance have been identified and described on the NAEP scale for each subject area: 150, 200, 250, 300, and 350.[3] The procedure for describing the five performance levels was the same in science, mathematics, and reading. Sets of questions were identified that were more likely to be answered correctly by students at one level than by those at the next lower level. Educators and curriculum experts representing each of the subject areas then carefully studied the sets of questions to develop descriptions for the five levels. These descriptions outline the concepts, skills, or processes demonstrated by correct responses to the questions at each level.

The procedure for describing the writing performance levels was somewhat different. Because the NAEP writing assessment is a direct measure of students' writing abilities, it does not contain questions or tasks that can be scored as correct or incorrect. Instead, students' responses to the writing tasks are rated according to the extent of task accomplishment. The descriptions of the five writing performance levels were developed by examining the ratings received by students whose overall performance was at one level in comparison to the ratings received by students at the next lower level.

Information about trends in students' attainment of performance levels is available back to 1977 in science, 1978 in mathematics, 1971 in reading, and 1984 in writing. Tables 1 through 4 present the percentages of students performing at or above each of the five levels in the first assessment year for which performance level data are available and in the 1996 assessment. In addition, the tables provide summary descriptions that characterize students' performance at each level.

Science. At age 9, the percentages of students attaining at least Levels 150, 200, 250, and 300 on the science scale increased between 1977 and 1996. Increases were also apparent in the percentages of 13-year-olds attaining at least Levels 150, 200, and 250. Although no significant increases were observed for 17-year-olds at the lower levels, the vast majority of students in this age group demonstrated the skills associated with these levels in both 1977 and 1996. At level 300 there was a significant increase between 1977 and 1996.

Mathematics. Similar to trends observed in science, the percentages of 9-year-olds at or above Levels 150, 200, 250, and 300 on the mathematics scale were higher in 1996 than in 1978. At age 13, nearly all students attained at least Levels 150 and 200 in both 1978 and 1996. There was an increase between the two assessment years in the percentages of 13-year-olds at or above Levels 200 and 250. Among 17-year-olds, performance at or above Levels 150, 200, and 250 was attained by nearly all students in both 1978 and 1996. The percentage of 17-year-old students reaching at least Levels 250 and 300 was higher in 1996 than in 1978.

[3] In theory, performance levels above 350 and below 150 could have been defined; however, so few students in the assessment performed at the extreme ends of the subject-area scales that it was not practical to do so.

Reading. In comparison to the assessment results in 1971, greater percentages of 9-year-olds in 1996 attained at least Levels 150, 200, and 250 on the reading scale. At age 13, most students performed at or above the two lowest levels, 150 and 200, in both 1971 and 1996. Increases were observed between the two assessment years in the percentages of 13-year-olds performing at or above Levels 250, 300, and 350. The vast majority of 17-year-olds attained at least Levels 150, 200 and 250 in both 1971 and 1996. The percentages of 17-year-old students at or above Levels 200 and 250 were higher in 1996 than in 1971.

Writing. At grade 4, the percentages of students attaining each of the performance levels on the writing scale in 1996 were not significantly different from those in 1984. Nearly all eighth graders performed at or above Levels 150 and 200 in both 1984 and 1996. However, the percentages of students in grade 8 who attained at least Levels 200 and 250 in 1996 were lower than the percentages in 1984. Almost all eleventh graders reached at least Levels 150 and 200, and the vast majority reached at least Level 250, in both 1984 and 1996. However, there was a decrease between the two assessment years in the percentages of students at grade 11 who demonstrated performance at or above Levels 250 and 300.

Table 1 **Percentages of Students Performing At or Above Science Performance Levels, Ages 9, 13, and 17, 1977 and 1996**

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Level		AGE 9		AGE 13		AGE 17	
		Percent in 1977	Percent in 1996	Percent in 1977	Percent in 1996	Percent in 1977	Percent in 1996
350	Can infer relationships and draw conclusions using detailed scientific knowledge	0 (0.0)	0 (0.1)	1 (0.1)	0 (0.2)	9 (0.4)	11 (1.0)
300	Has some detailed scientific knowledge and can evaluate the appropriateness of scientific procedures	3 (0.3)	4 (0.4) *	11 (0.5)	12 (0.7)	42 (0.9)	48 (1.3) *
250	Understands and applies general information from the life and physical sciences	26 (0.7)	32 (1.3) *	49 (1.1)	58 (1.1) *	82 (0.7)	84 (0.9)
200	Understands some simple principles and has some knowledge, for example, about plants and animals	68 (1.1)	76 (1.2) *	86 (0.7)	92 (0.8) *	97 (0.2)	98 (0.3)
150	Knows everyday science facts	94 (0.6)	97 (0.41) *	99 (0.2)	100 (0.1) *	100 (0.0)	100 (***)

Standard errors of the estimated percentages appear in parentheses. When no standard error appears (***), standard error estimates may not be accurately determined and/or the sampling distribution of the statistic does not match statistical test assumptions. In these cases statistical tests have not been conducted. (See Procedural Appendix.)

* Indicates that the percentage in 1996 is significantly different than that in 1977.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Table 2 Percentages of Students Performing At or Above Mathematics Performance Levels, Ages 9, 13, and 17, 1978 and 1996

Level		AGE 9		AGE 13		AGE 17	
		Percent in 1978	Percent in 1996	Percent in 1978	Percent in 1996	Percent in 1978	Percent in 1996
350	Can solve multistep problems and use beginning algebra	0 (***)	0 (***)	1 (0.2)	1 (0.1)	7 (0.4)	7 (0.8)
300	Can compute with decimals, fractions, and percents; recognize geometric figures; solve simple equations; and use moderately complex reasoning	1 (0.1)	2 (0.3) *	18 (0.7)	21 (1.2)	52 (1.1)	60 (1.7) *
250	Can add, subtract, multiply, and divide using whole numbers, and solve one-step problems	20 (0.7)	30 (1.0) *	65 (1.2)	79 (0.9) *	92 (0.5)	97 (0.4) *
200	Can add and subtract two-digit numbers and recognize relationships among coins	70 (0.9)	82 (0.8) *	95 (0.5)	99 (0.2) *	100 (0.1)	100 (***)
150	Knows some addition and subtraction facts	97 (0.3)	99 (0.2) *	100 (0.1)	100 (***)	100 (***)	100 (***)

Standard errors of the estimated percentages appear in parentheses. When no standard error appears (***), standard error estimates may not be accurately determined and/or the sampling distribution of the statistic does not match statistical test assumptions. In these cases statistical tests have not been conducted. (See Procedural Appendix.)

* Indicates that the percentage in 1996 is significantly different than that in 1978.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Table 3 Percentages of Students Performing At or Above Reading Performance Levels, Ages 9, 13, and 17, 1971 and 1996

Level		AGE 9		AGE 13		AGE 17	
		Percent in 1971	Percent in 1996	Percent in 1971	Percent in 1996	Percent in 1971	Percent in 1996
350	Can synthesize and learn from specialized reading materials	0 (***)	0 (***)	0 (0.0)	1 (0.2) *	7 (0.4)	6 (0.8)
300	Can find, understand, summarize, and explain relatively complicated information	1 (0.1)	1 (0.3)	10 (0.5)	14 (1.0) *	39 (1.0)	39 (1.4)
250	Can search for specific information, interrelate ideas, and make generalizations	16 (0.6)	18 (0.8) *	58 (1.1)	61 (1.3) *	79 (0.9)	81 (0.9) *
200	Can comprehend specific or sequentially related information	59 (1.0)	64 (1.2) *	93 (0.5)	93 (0.6)	96 (0.3)	97 (0.5) *
150	Can carry out simple, discrete reading tasks	91 (0.5)	93 (0.7) *	100 (0.0)	100 (0.1)	100 (0.1)	100 (***)

Standard errors of the estimated percentages appear in parentheses. When no standard error appears (***), standard error estimates may not be accurately determined and/or the sampling distribution of the statistic does not match statistical test assumptions. In these cases statistical tests have not been conducted. (See Procedural Appendix.)

* Indicates that the percentage in 1996 is significantly different than that in 1971.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Table 4 Percentages of Students Performing At or Above Writing Performance Levels, Grades 4, 8, and 11, 1984 and 1996

Level		GRADE 4		GRADE 8		GRADE 11	
		Percent in 1984	Percent in 1996	Percent in 1984	Percent in 1996	Percent in 1984	Percent in 1996
350	Can write effective responses containing supportive details and discussion	0 (***)	0 (***)	0 (***)	1 (0.2)	2 (0.7)	2 (0.5)
300	Can write complete responses containing sufficient information	1 (***)	1 (0.2)	13 (1.8)	16 (0.8)	39 (2.4)	31 (1.5) *
250	Can begin to write focused and clear responses to tasks	10 (1.0)	13 (1.2)	72 (2.6)	66 (1.3) *	89 (1.0)	83 (1.4) *
200	Can write partial or vague responses to tasks	54 (2.0)	59 (1.5)	98 (0.9)	96 (0.5) *	100 (0.3)	99 (0.2)
150	Can respond to tasks in abbreviated, disjointed, or unclear ways	93 (1.3)	93 (0.7)	100 (***)	100 (0.1)	100 (***)	100 (***)

Standard errors of the estimated percentages appear in parentheses. When no standard error appears (***), standard error estimates may not be accurately determined and/or the sampling distribution of the statistic does not match statistical test assumptions. In these cases statistical tests have not been conducted. (See Procedural Appendix.)

* Indicates that the percentage in 1996 is significantly different than that in 1984.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

Trends in Differences in Average Scale Scores Between Racial/Ethnic Groups of Students and Between Males and Females

As noted earlier, one of the national educational goals calls for increases in students' academic achievement. A stated objective of this goal is that the performance distribution for minority students will more closely reflect that of the student population as a whole.[4] In some of the subject areas assessed by NAEP, results indicated progress toward meeting this goal. Trends in the differences between average scores for subgroups of students are presented below.

Differences between White and Black Students. Although in 1996 White students attained higher average scores than their Black peers in each age group across the four subject areas, there was some indication that the gaps between White and Black students' average scores in science, mathematics, and reading have narrowed across the assessment years. Despite some fluctuations, however, the trend in writing scale score gaps demonstrates no consistent pattern of increases or decreases at any grade level.

In science, the trend toward smaller gaps among 17-year-olds is due predominately to a one-time decrease in the gap between 1982 and 1986. The narrowing of the gap between average scores of White and Black students aged 9 and 13 occurred in the late 1970s or 1980s. Although there has been little change in the 1990s, for all three ages the gaps in 1996 were smaller than those in 1970.

In mathematics and reading, scale score gaps between White and Black students aged 13 and 17 narrowed during the 1970s and 1980s. Although there was some evidence of widening gaps during the late 1980s and 1990s, the scale score gaps in 1996 were smaller than those in the first assessment year for 13- and 17-year-olds in mathematics and for 17-year-olds in reading. Among 9-year-olds, scale score gaps in mathematics and reading have generally decreased across the assessment years, resulting in smaller gaps in 1996 compared to those in the first assessment year.

[4] Executive Office of the President. (1990). *National goals for education.* Washington, DC: U.S. Government Printing Office.

Figure 2

Trends in Differences in Average Scale Scores
White vs. Black Students

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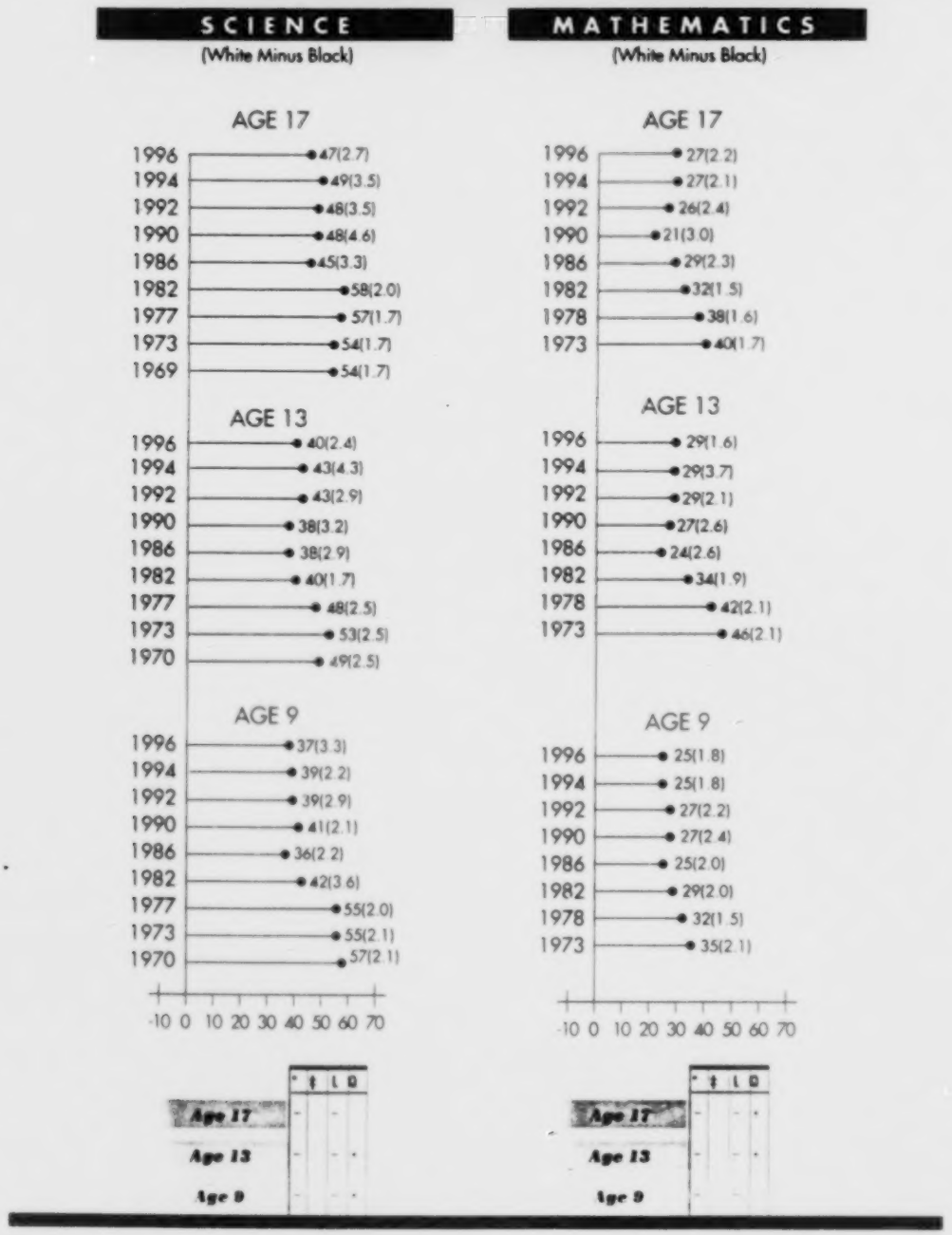

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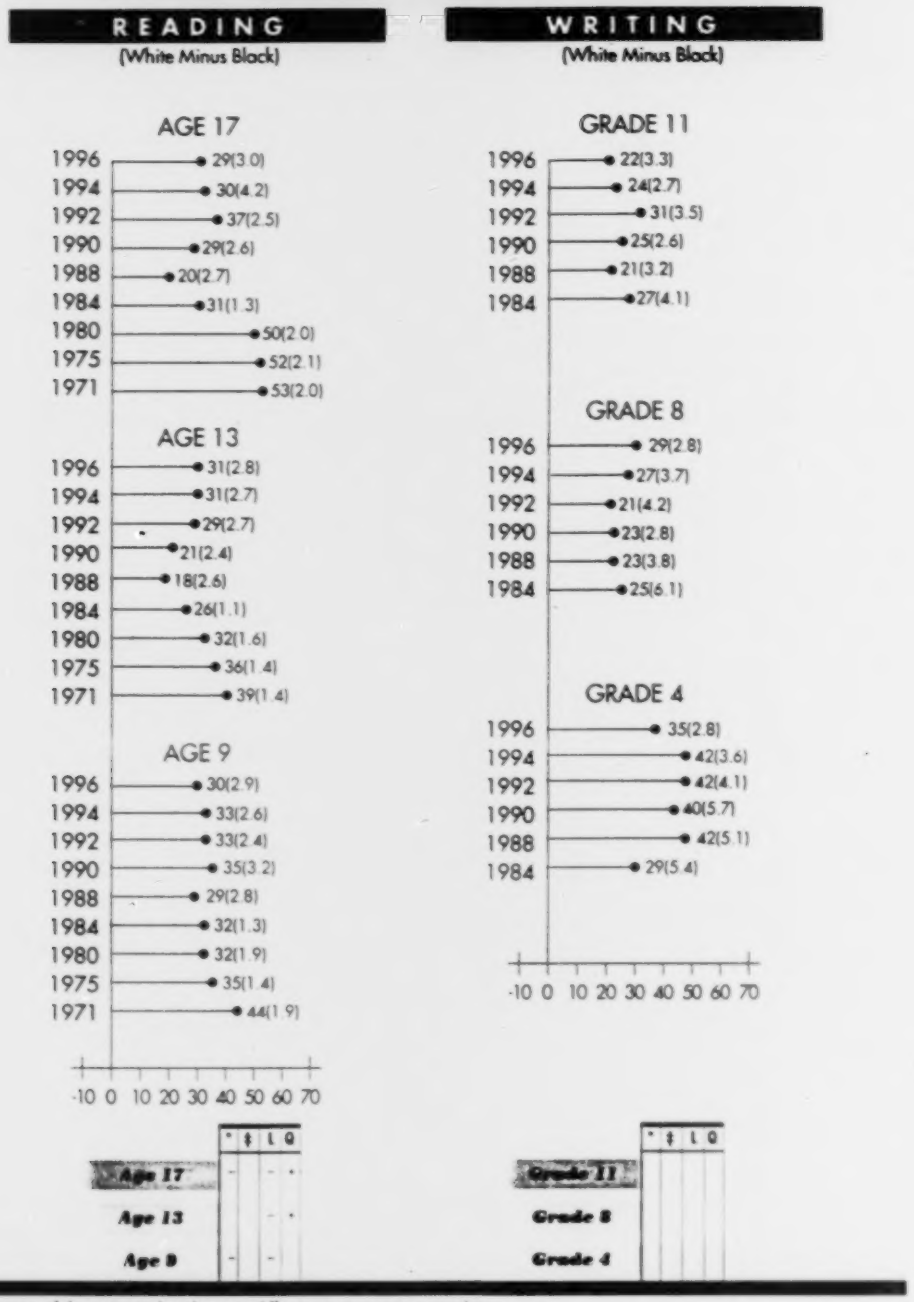
Figure 2 (continued)

Trends in Differences in Average Scale Scores
White vs. Black Students



Standard errors of the estimated scale score differences appear in parentheses.

* Indicates that the average scale score difference in 1996 is significantly larger (+) or smaller (–) than that in the first assessment year.

‡ Indicates that the average scale score difference in 1996 is significantly larger (+) or smaller (–) than that in 1994.

L Indicates that the positive (+) or negative (–) linear trend is significant.

Q Indicates that the positive (+) or negative (–) quadratic trend is significant.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Differences between White and Hispanic Students. In 1996, White students had higher average scores than Hispanic students at all three ages in each of the four subject areas. In science, mathematics, and reading, some significant changes in the magnitude of the gap between White and Hispanic students' average scores have occurred across the assessment years. However, no consistent pattern of increases or decreases is evident in the writing scale score gaps.

In science, there was some evidence that the gap between White and Hispanic 13-year-olds' average scores decreased between 1977 and 1982, but the gap has changed little since that time. The gap in the current year, 1996, among 13-year-olds was significantly different from that in 1977.

In mathematics, the gap among 17-year-olds has generally decreased across the assessment years, resulting in a gap in 1996 that was lower than that in 1973. At age 13, the gap in mathematics scores decreased from 1973 to 1986. Although the gap appears to have widened somewhat since that time, the gap in 1996 was smaller than that in 1973.

In reading, scale scores gaps among 17-year-olds decreased from 1975 to 1990. However, recent assessment results revealed some widening of the gap, and in 1996 the gap was not significantly different from that in 1975.

Figure 3

Trends in Differences in Average Scale Scores
White vs. Hispanic Students

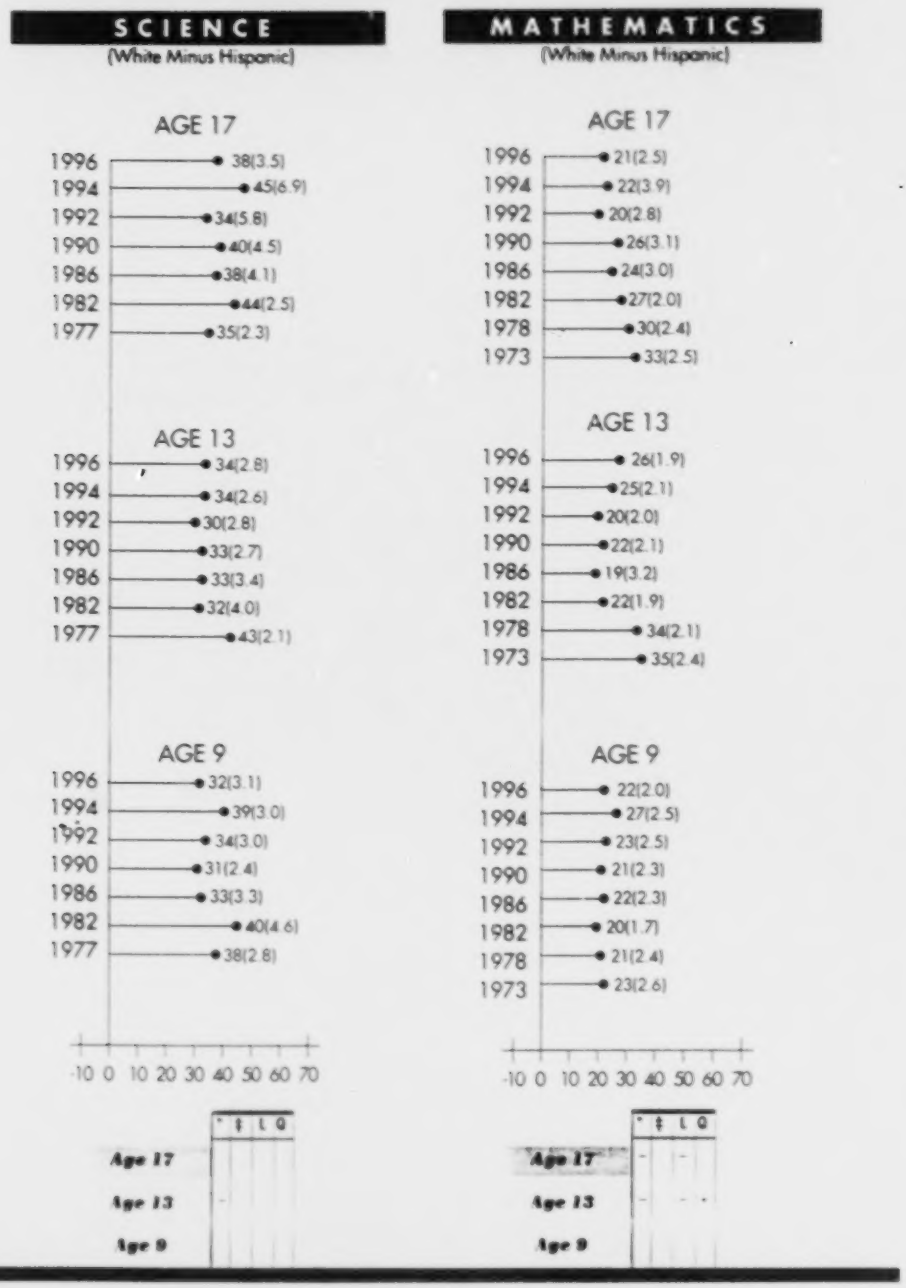

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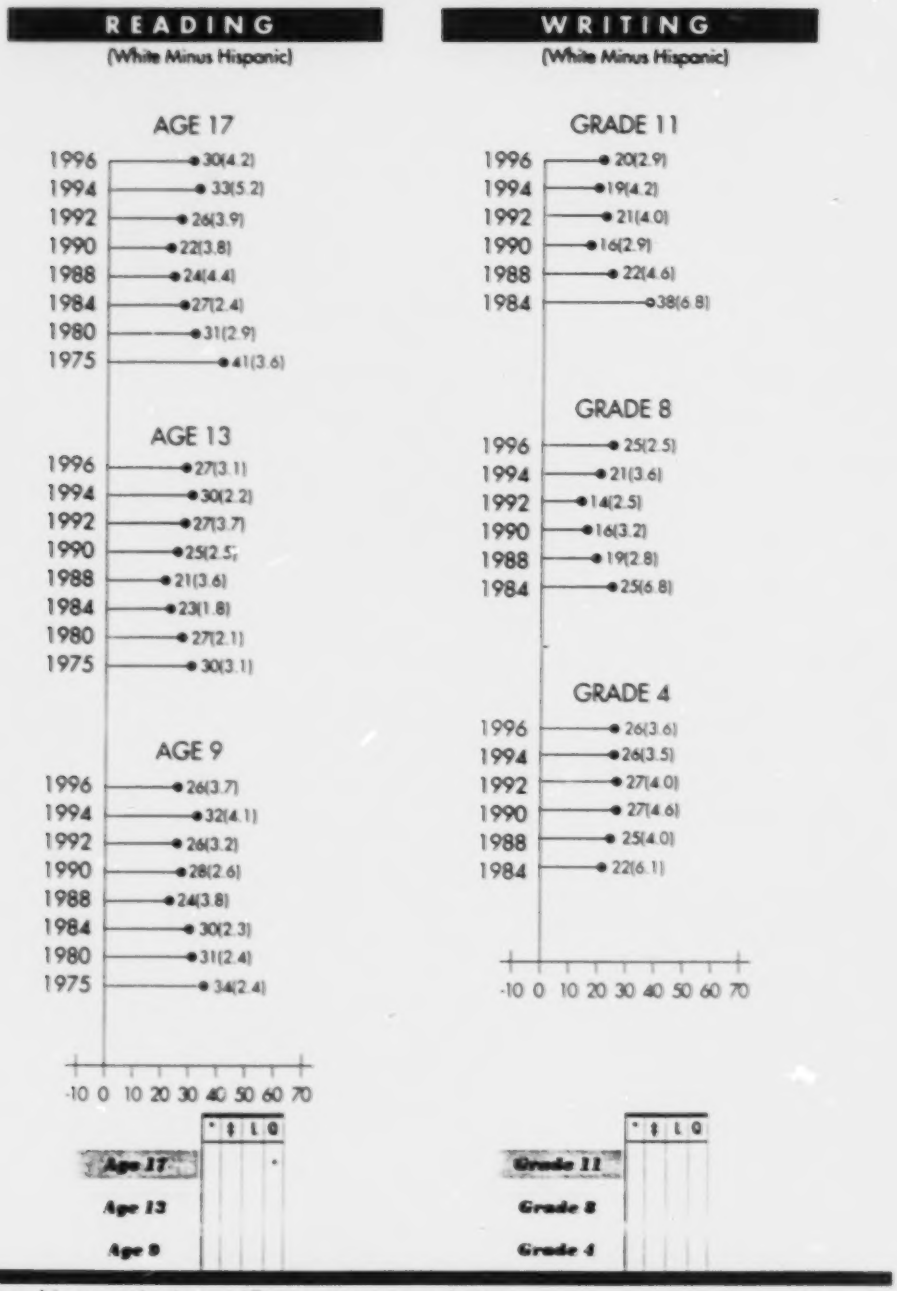
Figure 3 (continued)

Trends in Differences in Average Scale Scores
White vs. Hispanic Students



Standard errors of the estimated scale score differences appear in parentheses.

* Indicates that the average scale score in 1996 is significantly larger (+) or smaller (–) than that in the first assessment year.

‡ Indicates that the average scale score difference in 1996 is significantly larger (+) or smaller (–) than that in 1994.

L Indicates that the positive (+) or negative (–) linear trend is significant.

Q Indicates that the positive (+) or negative (–) quadratic trend is significant.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Differences between Males and Females. In 1996, the differences between average scores of male and female students varied across the four subject areas. In mathematics, male students outperformed female students in each age group. In science average scores for males students were higher than those for female students at ages 13 and 17, but there was no significant difference at age 9. In reading and writing, the results were reverse, with female students outperforming male students at each age or grade level. Some changes were observed across the assessment years in the performance differences between males and females in science, mathematics, and reading. However, the trend in writing scale score gaps demonstrates no consistent pattern of increases or decreases at any grade level.

In science, the overall trend at age 17 was one of narrowing gaps between male and female students, due primarily to a decrease that occurred after 1982. As a result, the gap in 1996 was smaller than that in 1969. At age 13, the gap in science scores widened from 1970 to 1982, narrowed again until 1992, but appears to have widened somewhat in the last two assessments. Despite these fluctuations, the gap in 1996 was not significantly different from that in 1970.

In mathematics, the trend at age 17 was toward smaller gaps across the assessments. However, in 1996 the gap between male and female 17-year-olds was not significantly different from that in 1973. Results across the assessment years for 9- and 13-year-olds in mathematics reveal a small but significant shift in the pattern of score differences between male and female students. At both ages, the trend has been away from higher average scores for female students toward higher average scores for male students.

In reading, the gaps between male and female students aged 13 and 17 narrowed between 1975 and 1980, but have fluctuated or increased somewhat since that time. In 1996, the scale score gap for both age groups was not significantly different from that in 1971.

Figure 4

Trends in Differences in Average Scale Scores
Male vs. Female Students

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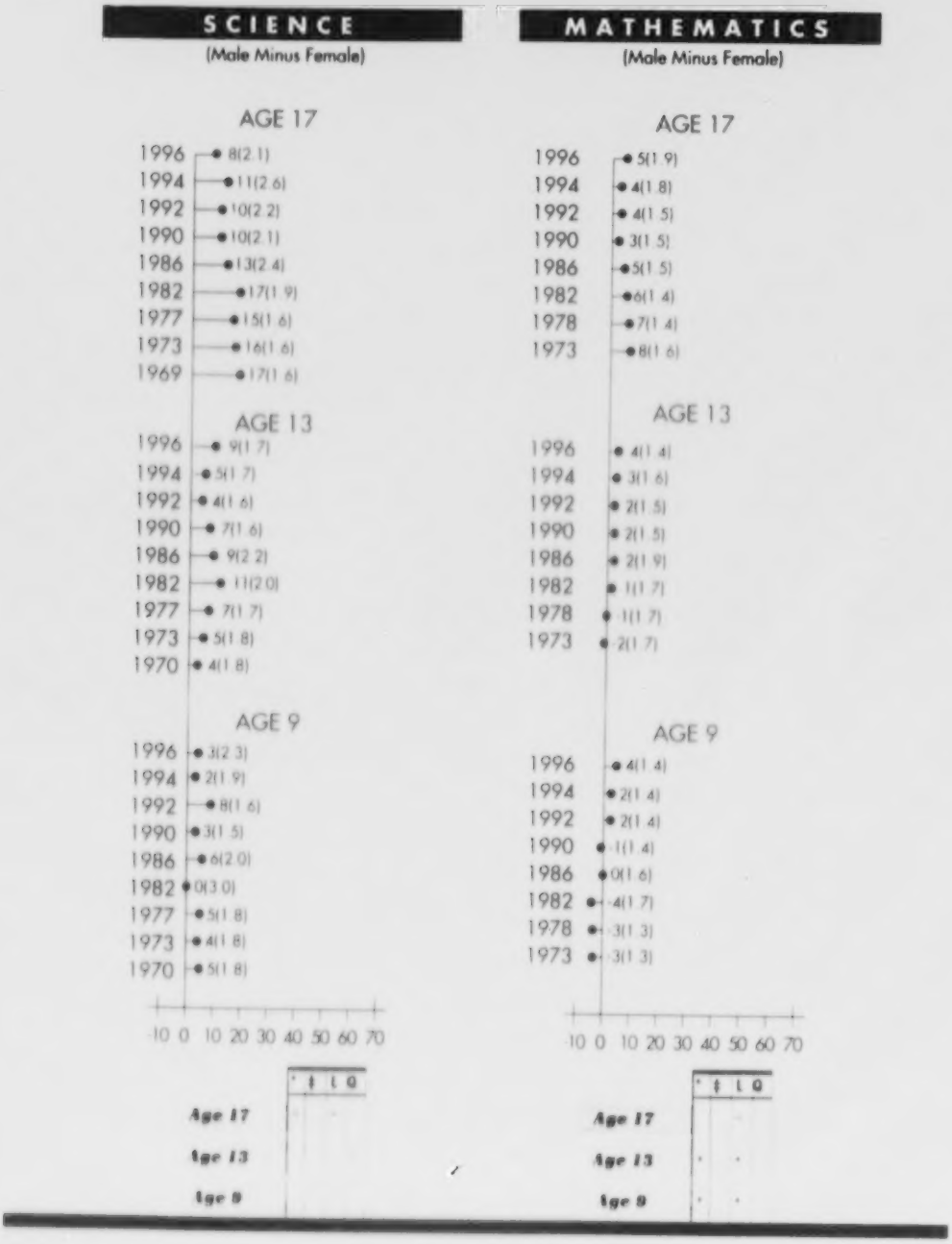

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Figure 4 (continued)

Trends in Differences in Average Scale Scores
Male vs. Female Students

READING
(Male Minus Female)

AGE 17

1996	-15(1.8)
1994	-13(2.7)
1992	-12(1.9)
1990	-13(2.0)
1988	-8(2.1)
1984	-11(1.0)
1980	-7(1.8)
1975	-12(1.4)
1971	-12(1.8)

AGE 13

1996	-13(1.6)
1994	-15(1.7)
1992	-11(2.1)
1990	-13(1.6)
1988	-11(1.7)
1984	-9(0.8)
1980	-8(1.4)
1975	-13(1.2)
1971	-11(1.3)

AGE 9

1996	-11(1.9)
1994	-7(1.9)
1992	-10(1.6)
1990	-11(2.0)
1988	-9(1.9)
1984	-7(1.1)
1980	-10(1.6)
1975	-12(1.1)
1971	-13(1.5)

-50 -40 -30 -20 -10 0 10 20 30

	*	‡	L	Q
Age 17				
Age 13				
Age 9				

WRITING
(Male Minus Female)

GRADE 11

1996	-18(1.9)
1994	-17(2.1)
1992	-17(2.3)
1990	-22(2.2)
1988	-17(2.3)
1984	-18(2.9)

GRADE 8

1996	-25(1.7)
1994	-24(2.2)
1992	-21(2.3)
1990	-22(2.0)
1988	-20(2.2)
1984	-19(3.4)

GRADE 4

1996	-14(2.6)
1994	-17(2.8)
1992	-18(2.4)
1990	-14(2.9)
1988	-14(3.0)
1984	-7(4.2)

-50 -40 -30 -20 -10 0 10 20 30

	*	‡	L	Q
Grade 11				
Grade 8				
Grade 4				

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Standard errors of the estimated scale score differences appear in parentheses.

* Indicates that the average scale score in 1996 is significantly larger (+) or smaller (–) than that in the first assessment year.

‡ Indicates that the average scale score difference in 1996 is significantly larger (+) or smaller (–) than that in 1994.

L Indicates that the positive (+) or negative (–) linear trend is significant.

Q Indicates that the positive (+) or negative (–) quadratic trend is significant.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

Students' Experiences Related to Academic Progress

Students' reports about their school and home experiences related to their learning in the different subject areas provide an important context for understanding trends in academic progress over time. Across the assessment years, NAEP has asked students about these relevant experiences and has examined the relationships between students' reports and their average scale scores. For each school and home factor presented in this report, results from the 1996 assessment are compared with results from the first assessment in which information on that contextual variable was collected.

Science and Mathematics Course Work. The percentages of 13- and 17-year-old students taking more challenging course work in science and mathematics increased over time, although the percentages of students taking the most advanced course work continue to be low.[3] Seventeen-year-old students assessed in 1996 were more likely than those in 1986 to report that they had taken biology and chemistry. However, there was no significant change between the two assessments in the percentage of students who reported taking physics.

Compared to 1986, a higher percentage of 13-year-olds in 1996 reported taking prealgebra and a lower percentage reported taking regular math. As shown in Table 5, there were increases between 1978 and 1996 in the percentages of 17-year-olds who reported that their highest level mathematics course was Algebra II or Precalculus/Calculus. Correspondingly, the percentages of students who reported that their highest level course was either General Mathematics/Prealgebra or Algebra I was lower in 1996 than in 1978.

Table 5 **Highest Level of Mathematics Course Work, Age 17, 1978 and 1996**

	Percentage of Students				
	General Mathematics or Prealgebra	Algebra I	Geometry	Algebra II	Precalculus or Calculus
1996	8 (0.6) *	12 (1.0) *	16 (1.0)	50 (1.6) *	13 (1.1) *
1978	20 (1.0)	17 (0.6)	16 (0.6)	37 (1.2)	6 (0.4)

Standard errors of the estimated percentages appear in parentheses.

* Indicates that the percentage in 1996 is significantly different than that in 1978.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

[3] A fuller discussion of science and mathematics course-taking patterns is presented in Chapters 2 and 4.

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Technology in the Classroom. Students' reports across the assessment years indicated an increased use of technology. In particular, the use of computers for a variety of classroom activities has risen dramatically.[6] Between 1977 and 1996, there was an increase in the percentage of 9-year-olds who reported using a calculator or thermometer in their classrooms. As shown in Table 6, 13- and 17-year-olds assessed in 1996 were far more likely than those assessed in 1978 to report that they had studied mathematics through computer instruction. Table 6 also reveals increases in the percentages of students in grades 8 and 11 who reported that they had used a computer to write stories or papers. The change in students' use of computers for writing was dramatic — from 15 percent to 91 percent at grade 8, and from 19 percent to 96 percent at grade 11.

Table 6 **Computer Usage in Mathematics (Ages 13 and 17) and Writing Instruction (Grades 8 and 11), 1978/1984 and 1996**

		Percentage of Students Answering "YES"	
		AGE 13	**AGE 17**
Studied mathematics through computer instruction	1996	54 (1.8) *	42 (2.1) *
	1978	14 (0.9)	12 (1.1)
		GRADE 8	**GRADE 11**
Used a computer to write stories or papers	1996	91 (1.2) *	96 (1.1) *
	1984	15 (3.5)	19 (2.2)

Standard errors of the estimated percentages appear in parentheses.

* Indicates that the percentage in 1996 is significantly different than that in 1978 or 1984.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

[6] A fuller discussion of technology use in classrooms is presented in Chapters 2, 4, and 8.

Homework. The reports of 13- and 17-year-olds about the amount of time they spent each day on homework did not change significantly between 1984 and 1996; however, some changes did occur at age 9. In 1996, the percentage of 9-year-olds who reported that they did not have homework assigned was lower than the percentage in 1984. Correspondingly, the percentage of 9-year-olds who reported doing less than 1 hour of homework each day increased between 1984 and 1996. However, the percentage of students aged 9 who reported doing more than 2 hours of homework decreased.[7]

Students at all three ages were also asked about the number of pages they read each day in school and for homework. As shown in Table 7, although there were no significant changes in the reports of 17-year-olds, the reports of both 9- and 13-year-old students indicated an increase in the number of pages read each day. Between 1984 and 1996, there was an increase in the percentage of 9-year-olds who reported reading more than 20 pages, and a decrease in the percentage who reported reading 5 or fewer pages. Similarly, the reports of 13-year-olds showed an increase in the percentage of students who read more than 20 pages each day, and a decrease in the percentage who reported reading 6 to 10 pages.

Table 7 Pages Read in School and for Homework Per Day, Ages 9, 13, and 17, 1984 and 1996

		Percentage of Students		
		AGE 9	AGE 13	AGE 17
More than 20 pages	1996	17 (1.0) *	14 (0.7) *	21 (1.1)
	1984	13 (0.4)	11 (0.4)	20 (1.0)
16 to 20 pages	1996	16 (0.9)	13 (0.6)	14 (0.7)
	1984	13 (0.5)	11 (0.2)	14 (0.4)
11 to 15 pages	1996	15 (0.7)	18 (0.8)	18 (0.8)
	1984	14 (0.5)	18 (0.4)	18 (0.3)
6 to 10 pages	1996	25 (1.0)	31 (0.8) *	25 (1.0)
	1984	25 (0.5)	35 (0.5)	26 (0.6)
5 or fewer pages	1996	26 (1.1) *	25 (1.0)	22 (0.8)
	1984	35 (1.0)	27 (0.6)	21 (0.8)

Standard errors of the estimated percentages appear in parentheses.

* Indicates that the percentage in 1996 is significantly different than that in 1984.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

[7] A fuller discussion of time spent on homework is presented in Chapter 6.

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Home Experiences Related to Learning. Because students' experiences outside of school may have at least as much influence on their academic progress as their classroom experiences, the NAEP trend background questionnaires include questions about home factors related to learning.[8] At grades 4, 8, and 11, a greater percentage of students in 1996 than in 1984 reported using a computer in their homes. Also, a greater percentage of students in grades 8 and 11 reported writing stories or poems that were not for school work at least once a week. However, a greater percentage of eleventh-grade students reported that other people in their family never or hardly ever wrote letters to relatives or friends. Between 1984 and 1996, there were no significant changes in 13- and 17-year-old students' reports about the frequency of reading done by other people in their homes. At ages 9, 13, and 17, students' reports indicated a decrease between 1971 and 1996 in the number of different types of reading materials in their homes.

Past NAEP assessments have shown a relationship between achievement and both reading for fun and television watching. As shown in Table 8, there was no significant difference between 1984 and 1996 in 9- and 13-year-old students' reports about the amount of time they spent reading for fun. At age 17, there was a decrease in the percentage of students who reported reading for fun daily and an increase in the percentage who reported that they never read for fun.

Table 8 — Reading for Fun, Ages 9, 13, and 17, 1984 and 1996

		Percentage of Students		
		AGE 9	AGE 13	AGE 17
Daily	1996	54 (1.9)	32 (1.9)	23 (2.0) *
	1984	53 (1.0)	35 (1.0)	31 (0.8)
Weekly	1996	27 (1.8)	31 (2.1)	32 (2.7)
	1984	28 (0.8)	35 (1.2)	34 (1.1)
Monthly	1996	8 (1.0)	15 (1.4)	17 (1.5)
	1984	7 (0.6)	14 (0.8)	17 (0.5)
Yearly	1996	3 (0.5)	9 (1.2)	12 (1.6)
	1984	3 (0.3)	7 (0.5)	10 (0.5)
Never	1996	8 (0.8)	13 (1.5)	16 (2.1) *
	1984	9 (0.5)	9 (0.6)	9 (0.6)

Standard errors of the estimated percentages appear in parentheses.

* Indicates that the percentage in 1996 is significantly different than that in 1984.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

[8] A fuller discussion of home factors related to learning is presented in Chapters 6 and 8.

Students' responses to a question about the amount of time they spend watching television each day show mixed results across the three ages. As shown in Table 9, a greater percentage of 9-year-olds in 1996 than in 1982 reported watching 3 to 5 hours of television every day and a lower percentage reported watching 6 or more hours every day. Although the difference was not significant, the percentage of students who reported watching television for 2 hours or less appeared to increase. These findings suggest that 9-year-olds in 1996 were spending slightly less time watching television than were their counterparts in 1982. The percentage of 13-year-olds who reported watching television 2 hours or less each day decreased, while the percentage who reported watching 3 to 5 hours increased. However, there was a drop in the percentage of 13-year-olds who reported watching 6 or more hours of television. The trend toward increased television watching is more apparent among 17-year-olds. As compared to 1978, a greater percentage of 17-year-old students in 1996 reported watching 3 hours or more of television each day, while a lower percentage reported watching 2 hours or less of television.

Table 9 **Television Watching, Ages 9, 13, and 17, 1978/1982 and 1996**

		Percentage of Students		
		NUMBER OF HOURS WATCHED PER DAY		
		0-2 Hours	3-5 Hours	6 or More Hours
Age 9	1996	47 (1.1)	36 (1.0) *	18 (0.9) *
	1982	44 (1.1)	29 (0.6)	26 (1.0)
Age 13	1996	39 (1.2) *	48 (0.9) *	13 (0.6) *
	1982	45 (0.8)	39 (0.4)	16 (0.8)
Age 17	1996	54 (1.2) *	39 (1.1) *	7 (0.5) *
	1978	69 (0.7)	26 (0.6)	5 (0.2)

Standard errors of the estimated percentages appear in parentheses.

* Indicates that the percentage in 1996 is significantly different than that in 1978 or 1982.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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This Report

A primary purpose of the National Assessment of Educational Progress is to measure trends in academic performance across time. This report, *NAEP 1996 Trends in Academic Progress*, provides a broad examination of students' learning in four core academic areas: science, mathematics, reading, and writing. In addition to overall results, an extensive discussion of the performance of subgroups of students is provided (e.g., racial/ethnic subgroups, males and females). Relevant aspects of students' performance and of home and school factors related to achievement are presented as well.

This report contains six sections. The first four sections correspond to the four subject areas assessed. The first chapter in each subject area section presents overall scale score results for the nation and for subgroups of students, as well as students' attainment of specific performance levels on the NAEP scale. The second chapter in each subject area section discusses students' reports of home and school experiences related to performance. Finally, the report concludes with a Procedural Appendix and a Data Appendix.

Part I Science

Introduction

The current emphasis on science reform in the United States is rooted in the report *A Nation at Risk*, issued in 1983 by the National Commission on Excellence in Education.[1] This and other reports published in the 1980s pointed out the deficiencies of the educational system and proposed ways to address them, fueling interest in reform.[2] Since then, governmental, professional, and private organizations have all played a role in subsequent reform efforts at state and local levels.[3] Areas of interest include the development of standards, revision of curricula, development of appropriate assessment techniques, and professional development. Several organizations have worked closely with the authors of the National Science Education Standards[4] and published documents to help teachers interpret these standards.[5]

To help policy makers and educators assess the outcomes of their pursuit of excellence in science learning, it is important to find out what American students know and can do in science. The National Assessment of Educational Progress (NAEP) plays a central role in this undertaking. Over the past 27 years, NAEP has administered nine long-term trend assessments to monitor progress in the science performance of 9-, 13-, and 17-year-old students. In addition, the long-term trend assessments included questions about students' experiences related to learning science. These assessments were administered in 1969-70, 1972-73, 1976-77, 1981-82, 1985-86, 1989-90, 1991-92, 1993-94, and 1995-96. The subsequent text refers to each assessment by the last half of the school year in which it was administered: 1969 or 1970, 1973, 1977, 1982, 1986, 1990, 1992, 1994, and 1996. It should be noted that some of the analyses reported in this section do not go back to the first science trend assessment because the data are not available.

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1 National Commission on Excellence in Education (1983). *A nation at risk: The imperative for education reform.* Washington, DC.

2 Commission on Precollege Education in Mathematics, Science, and Technology (1983). *Educating Americans for the 21st century: A report to the American people and the National Science Board.* Washington, DC: National Science Board.

3 The National Science Foundation (1995/1996). *Statewide systemic initiatives in science, mathematics, and engineering.* Arlington, VA.

National Science Teachers Association (1995). *Scope, sequence, and coordination of high school science.* Washington, DC.

Project 2061 (1993). *Benchmarks for science literacy.* Washington, DC: American Association for the Advancement of Science.

National Center on Education and the Economy (1993). *New standards project.* Washington, DC.

4 National Research Council (1995). *National science education standards.* Washington, DC.

5 National Science Teachers Association (1995). *A high school framework for national science education standards.* Arlington, VA.

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The NAEP Long-Term Trend Science Assessment

In addition to the long-term trend assessment, NAEP conducted a 1996 survey of science achievement among students in grades 4, 8, and 12. To keep abreast of current pedagogical research, this most recent "main" NAEP science assessment included performance tasks such as hands-on investigations and constructed-response questions, as well as multiple-choice questions. Results from the 1996 main NAEP science assessment are presented in a separate report.[6]

Two important features distinguish the long-term trend assessment in science from the main NAEP science assessment: sampling procedures and instrumentation. Data collection for the main NAEP science assessment conducted in 1996 involved national samples of students in grades 4, 8, and 12, and state samples of students in grade 8. In contrast, the long-term trend assessment conducted in 1996 sampled students from across the country at ages 9, 13, and 17. Another important difference between the 1996 main NAEP science assessment and the long-term trend assessment in science was the sets of questions administered. To allow for measuring trends in achievement since the first long-term trend assessment in science, the administration procedures and assessment content were replicated in each trend assessment, including 1996. While the new instrument developed for the 1996 main NAEP assessment placed particular emphasis on constructed-response questions and performance tasks, the long-term trend assessment contains only multiple-choice questions.

Although the main NAEP assessments in each subject area are changed periodically to reflect contemporary educational goals and curriculum content (e.g., the 1996 main NAEP science assessment), the long-term trend science assessment reflects educational objectives that were established in 1969 for 17-year-olds and 1970 for 9- and 13-year-olds. As such, the long-term trend assessment may represent a more constrained view of science in comparison to that of the main science assessment conducted in 1996. The long-term trend assessment in science contains a content dimension and a cognitive dimension.[7] The content dimension assesses life science, physical science, and earth and space science. The cognitive dimension assesses students' ability to conduct inquiries, solve problems, and know science. NAEP also assesses students' understanding of the nature of science within the context of both content area knowledge and cognition. In contrast, the framework for the 1996 main NAEP science assessment specified that students not only be assessed in different areas of science, but also with interdisciplinary exercises that merge technology with the science content areas. Furthermore, the 1996 main assessment included blocks of questions organized around themes that constitute major, interdisciplinary organizing principles of science: models, systems, and patterns of change.[8]

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[6] O'Sullivan, C. Y., Reese, C. M., and Mazzeo, J. (1997). *NAEP 1996 science report card for the nation and the states.* National Center for Education Statistics. Washington, DC: U. S. Government Printing Office.

[7] National Assessment of Educational Progress (1986). *Science objectives: 1985-1986 assessment.* Princeton, NJ.
National Assessment of Educational Progress (1989). *Science objectives: 1990 assessment.* Princeton, NJ.

[8] National Assessment Governing Board (1996). *Science framework for the 1996 National Assessment of Educational Progress.* Washington, DC.

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Because of the differences in sampling procedures and assessment content, results from the 1996 main and state NAEP science assessments are not directly comparable to those from the 1996 long-term trend assessment in science. However, results from the trend assessments can provide valuable information about the attainment of long-held educational goals during a time of change and reform. For example, while school curricula shift toward increased emphasis on the application of science knowledge and the ability to communicate scientific concepts, long-term trend results indicate whether students are maintaining their grasp of basic science knowledge and skills. Long-term trend assessments also examine whether current students have greater knowledge of science than did their peers of one and two decades ago.

Analysis Procedures

Estimates of average student performance in the long-term trend assessments were calculated using analysis techniques based on item response theory (IRT). The resultant scale, which spans 0 to 500, allows for comparisons of average scores across assessments, age groups, and demographic subpopulations. (The Procedural Appendix contains more detailed explanations of the analysis procedures and definitions of student subpopulations.) Five different levels of science performance have been defined on the NAEP trend scale:

Level 150 – Knows Everyday Science Facts;

Level 200 – Understands Simple Scientific Principles;

Level 250 – Applies General Scientific Information;

Level 300 – Analyzes Scientific Procedures and Data; and

Level 350 – Integrates Specialized Scientific Information.

NAEP reports the performance of groups and subgroups of students, not individuals. Two measures of performance are used in this section: the average scores of groups of students on the NAEP science scale, and the percentages of students within each group attaining each of the five performance levels. Because the average scale scores and the percentages are based on samples of students and are subject to sampling and measurement error, standard errors are included with the results presented here.

In the tables and figures that present science trend results, the 1996 assessment was statistically compared to two previous assessments: the prior assessment in 1994, and the first assessment which provided sufficient data on the variables being tested (i.e., the base year). The purpose of year-to-year statistical tests was to determine whether the results in the 1996 assessment were different from the results of the previous assessment or whether any changes had taken place since the base year assessment. Tests of other year-to-year comparisons can be found in previous reports of NAEP long-term trend assessments.

In addition to comparisons between individual assessment years, a second test of significance was conducted to detect statistically significant linear and quadratic trends across assessments. (See the Procedural Appendix for a discussion of the procedure.) This type of analysis makes it possible to discuss statistically significant patterns that may be missed by year-to-year comparisons. For example, from assessment to assessment, students' average scale

scores may consistently increase (or decrease) by a small amount. Although these small increases (or decreases) between years may not be statistically significant under pairwise multiple comparisons, the overall increasing (or decreasing) trend in average scores may be statistically significant and noteworthy. The purpose of trend tests is to determine whether the results of the series of assessments could be generally characterized by a line or a simple curve. A linear trend tests for cumulative change over the entire assessment period, such as an increase or decrease at a relatively constant rate. Simple curvilinear (i.e., quadratic) relationships represent more complex patterns. Two examples of such patterns include initial score declines over part of the time period followed by subsequent increases in more recent assessments, or a pattern of initial score increases over a time period followed by a period of relatively stable performance.

This Section

The two chapters in Part I concentrate on different aspects of student performance. Trends in average science scale scores for the nation and demographic subpopulations are reported in Chapter 1. Also included are definitions of levels of science performance and information on the percentages of students attaining successive levels in each assessment. Chapter 2 summarizes trends in students' responses to questions about participation in science activities, course taking, and other student behaviors and attitudes.

In Chapter 1, the results of statistical tests conducted to determine significant differences between 1996 and the first assessment year, and between 1996 and 1994, are indicated in grids that appear next to or below the figures and tables. The results from tests comparing the base year and 1996 assessments are summarized in the column labeled with the asterisk symbol "*." Significant differences are denoted with a "+" or "-" sign indicating that the 1996 average score was either greater than or less than the base year score, respectively. Similarly, significant differences between 1994 and 1996 assessment results are denoted with a "+" or "-" sign under the column labeled with the dagger symbol "†" indicating that the 1996 average score was either greater or smaller than the 1994 average, respectively. The results from the linear and quadratic trend tests are summarized in the columns labeled "L" and "Q," respectively. Within each column, significant positive trends are denoted by a "+" sign and significant negative trends are denoted with a "-" sign. In Chapter 2, where only the first and most recent assessment results are presented, significant differences between the base year and 1996 are indicated within the tables. All of the differences and trend patterns discussed in this report are statistically significant at the .05 level.

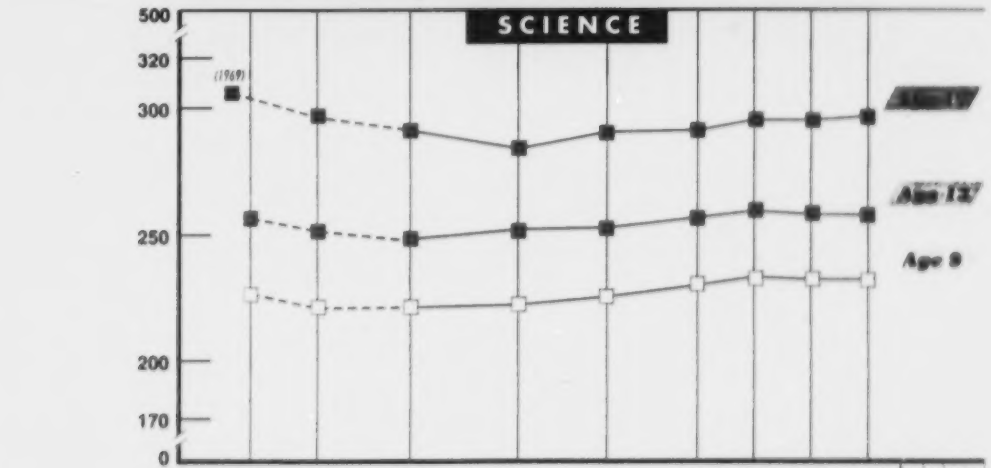
Chapter 1

Science Scores for the Nation and Selected Subpopulations

Results for the Nation from 1969-70 to 1996

Figure 1.1 depicts trends in average science scores for 9-, 13-, and 17-year-old students from 1969 to 1996. The results for 1969 (17-year-olds only), 1970 (9- and 13-year-olds), and 1973 (all age groups) are extrapolated from previous analyses of NAEP data and are represented by dotted lines. Results for the 1977, 1982, 1986, 1990, 1992, 1994, and 1996 assessments are based on more recent analyses and are represented by solid lines. (Refer to the Procedural Appendix for details of scaling methodology and information about drawing inferences from trend analyses.)

Figure 1.1 Trends in Average Science Scale Scores for the Nation, 1969-70 to 1996



	1970	1973	1977	1982	1986	1990	1992	1994	1996	*	‡	L	Q
Age 17	305 (1.0)	296 (1.0)	290 (1.0)	283 (1.2)	289 (1.4)	290 (1.1)	294 (1.3)	294 (1.6)	296 (1.2)	–		–	+
Age 13	255 (1.1)	250 (1.1)	247 (1.1)	250 (1.3)	251 (1.4)	255 (0.9)	258 (0.8)	257 (1.0)	256 (1.0)			+	+
Age 9	225 (1.2)	220 (1.2)	220 (1.2)	221 (1.8)	224 (1.2)	229 (0.8)	231 (1.0)	231 (1.2)	230 (1.2)	+		+	+

Standard errors of the estimated scale scores appear in parentheses. [- - -] Extrapolated from previous NAEP analyses.

* Indicates that the average scale score in 1996 is significantly larger (+) or smaller (–) than that in 1969-70.

‡ Indicates that the average scale score in 1996 is significantly larger (+) or smaller (–) than that in 1994.

L Indicates that the positive (+) or negative (–) linear trend is significant.

Q Indicates that the positive (+) or negative (–) quadratic trend is significant.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

Seventeen-year-olds. The performance of 17-year-old students dropped from 1969 to 1982. Although performance has improved since that time, the overall trend was one of decreased performance. The average score in 1996 was not significantly different from the average in 1994, but was below the 1969 average.

Thirteen-year-olds. The average score of 13-year-olds declined during the 1970s, but has increased since then. Despite an overall pattern of improved performance, the average score in 1996 did not differ significantly from that in 1994 or in 1970.

Nine-year-olds. During the early 1970s, the average science scores of 9-year-olds declined. Since 1982, however, the performance of this age group has improved, and the overall pattern was one of increasing scores. Although there was no significant increase from 1994 to 1996, the average score for 9-year-olds was higher in 1996 than in 1970.

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National Trends in Levels of Science Performance from 1977 to 1996

To provide more information about students' knowledge and skills in science, five levels of performance were established on the science trend scale: 150, 200, 250, 300, and 350 (see Procedural Appendix for details).[9] Performance was "anchored" at the five levels by using empirical procedures that identified sets of assessment questions that students who performed at one level were more likely to answer correctly than students who performed at the next lower level. The types of knowledge and skills that these sets of questions assessed were then identified and used as a basis for constructing descriptions of performance at the five scale levels. Figure 1.2 provides these descriptions for the five anchor levels.

Figure 1.2 Levels of Science Performance

Level 350:

Integrates Specialized Scientific Information

Students at this level can infer relationships and draw conclusions using detailed scientific knowledge from the physical sciences, particularly chemistry. They also can apply basic principles of genetics and interpret the social implications of research in this field.

Level 300:

Analyzes Scientific Procedures and Data

Students at this level can evaluate the appropriateness of the design of an experiment. They have more detailed scientific knowledge and the skill to apply their knowledge in interpreting information from text and graphs. These students also exhibit a growing understanding of principles from the physical sciences.

Level 250:

Applies General Scientific Information

Students at this level can interpret data from simple tables and make inferences about the outcomes of experimental procedures. They exhibit knowledge and understanding of the life sciences, including a familiarity with some aspects of animal behavior and of ecological relationships. These students also demonstrate some knowledge of basic information from the physical sciences.

Level 200:

Understands Simple Scientific Principles

Students at this level are developing some understanding of simple scientific principles, particularly in the life sciences. For example, they exhibit some rudimentary knowledge of the structure and function of plants and animals.

Level 150:

Knows Everyday Science Facts

Students at this level know some general scientific facts of the type that could be learned from everyday experiences. They can read simple graphs, match the distinguishing characteristics of animals, and predict the operation of familiar apparatuses that work according to mechanical principles.

[9] In theory, performance levels above 350 and below 150 could have been defined; however, so few students in the assessment performed at the extreme ends of the science scale that it was not practical to do so.

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Table 1.1 presents the percentages of students performing at or above the five science performance levels in the seven assessments conducted since 1977.[10] (Performance level data are not available for assessment years with extrapolated results.) The results for each performance level are discussed separately. Data on performance levels by gender, race/ethnicity, modal grade, region, parents' education level, type of school, and quartiles can be found in the Data Appendix.

Table 1.1 **Trends in Percentage of Students At or Above Five Science Performance Levels, 1977 to 1996**

Performance Levels	Age	Assessment Years										
		1977	1982	1986	1990	1992	1994	1996	*	‡	L	Q
Level 350	9	0 (0.0)	0 (***)	0 (***)	0 (0.0)	0 (***)	0 (0.0)	0 (0.1)				
Integrates Specialized	13	1 (0.1)	0 (0.1)	0 (0.1)	0 (0.1)	0 (0.1)	0 (0.1)	0 (0.2)				
Scientific Information	17	9 (0.4)	7 (0.4)	8 (0.7)	9 (0.5)	10 (0.7)	10 (0.8)	11 (1.0)			+	+
Level 300	9	3 (0.3)	2 (0.7)	3 (0.5)	3 (0.3)	3 (0.3)	4 (0.4)	4 (0.4)	+		+	+
Analyzes Scientific	13	11 (0.5)	10 (0.7)	9 (0.9)	11 (0.6)	12 (0.8)	12 (0.9)	12 (0.7)			+	+
Procedures and Data	17	42 (0.9)	37 (0.9)	41 (1.4)	43 (1.3)	47 (1.5)	48 (1.3)	48 (1.3)	+		+	+
Level 250	9	26 (0.7)	24 (1.8)	28 (1.4)	31 (0.8)	33 (1.0)	34 (1.2)	32 (1.3)	+		+	
Applies General	13	49 (1.1)	51 (1.6)	53 (1.6)	57 (1.0)	61 (1.1)	60 (1.1)	58 (1.1)	+		+	
Scientific Information	17	82 (0.7)	77 (1.0)	81 (1.3)	81 (0.9)	83 (1.2)	83 (1.2)	84 (0.9)			+	+
Level 200	9	68 (1.1)	71 (1.9)	72 (1.1)	76 (0.9)	78 (1.2)	77 (1.0)	76 (1.2)	+		+	
Understands Simple	13	86 (0.7)	90 (0.8)	92 (1.0)	92 (0.7)	93 (0.5)	92 (0.6)	92 (0.8)	+		+	−
Scientific Principles	17	97 (0.2)	96 (0.5)	97 (0.5)	97 (0.3)	98 (0.5)	97 (0.7)	98 (0.3)			+	+
Level 150	9	94 (0.6)	95 (0.7)	96 (0.3)	97 (0.3)	97 (0.3)	97 (0.4)	97 (0.4)	+		+	−
Knows Everyday	13	99 (0.2)	100 (0.1)	100 (0.1)	100 (0.1)	100 (0.1)	100 (0.1)	100 (0.1)	+		+	−
Science Facts	17	100 (0.0)	100 (0.1)	100 (***)	100 (***)	100 (***)	100 (0.1)	100 (***)				

Standard errors of the estimated percentages appear in parentheses. When no standard error appears (***), standard error estimates may not be accurately determined and/or the sampling distribution of the statistic does not match statistical test assumptions. In these cases statistical tests have not been conducted. (See Procedural Appendix.)

* Indicates that the percentage in 1996 is significantly larger (+) or smaller (–) than that in 1977.

‡ Indicates that the percentage in 1996 is significantly larger (+) or smaller (–) than that in 1994.

L Indicates that the positive (+) or negative (–) linear trend is significant.

Q Indicates that the positive (+) or negative (–) quadratic trend is significant.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

[10] The performance levels are based upon a vertical scale that assumes knowledge is cumulative. Younger students are not expected to have the same amount of knowledge as older students. Therefore, most 9-year-olds are not expected to reach the upper levels of performance.

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Level 350: After a slight decline in the early 1980s, there was an increase in the percentage of 17-year-olds who were able to integrate specialized scientific information, and the overall trend was one of increased percentages. Less than one percent of 9- and 13-year-olds attained this level in 1996.

Level 300: Students' performance at this level was characterized by the ability to analyze scientific procedures and data. For all three age groups, there was evidence of early declines followed by increases in the percentage of students reaching this level. The overall pattern was one of increased percentages of students in each age group attaining at least this level. The percentage of 17-year-old students at this performance level was higher in 1996 than in 1977, but there was no significant difference for the 13-year-olds. Although the difference is small, a significantly higher percentage of 9-year-olds attained this level in 1996 than in 1977.

Level 250: After a decline between 1977 and 1982, the percentage of 17-year-olds able to apply general scientific information increased, and the overall trend was positive. However, the 1996 percentage did not differ significantly from that in 1977. For both 9- and 13-year-olds, the overall trend showed improvement across the assessments, and the 1996 percentage of students at or above this level was higher than the 1977 percentage.

Level 200: In 1996, as in earlier assessment years, most 17-year-olds performed at or above this level, demonstrating understanding of simple scientific principles. The percentage of 13-year-olds reaching this level increased between 1977 and 1986 and has been stable since that time. Among 9-year-olds, an overall pattern of increase was observed in the percentage of students reaching this level. For both 9- and 13-year-olds, the percentage of students at or above this level in 1996 was significantly higher than in 1977.

Level 150: In 1996, nearly all students at all three ages demonstrated knowledge of everyday science facts and an ability to perform tasks at this most basic level. At ages 9 and 13, an increase between 1977 and 1996 was observed in the percentage of students attaining at least this level of performance.

Trends in Science Scale Scores by Quartile from 1977 to 1996

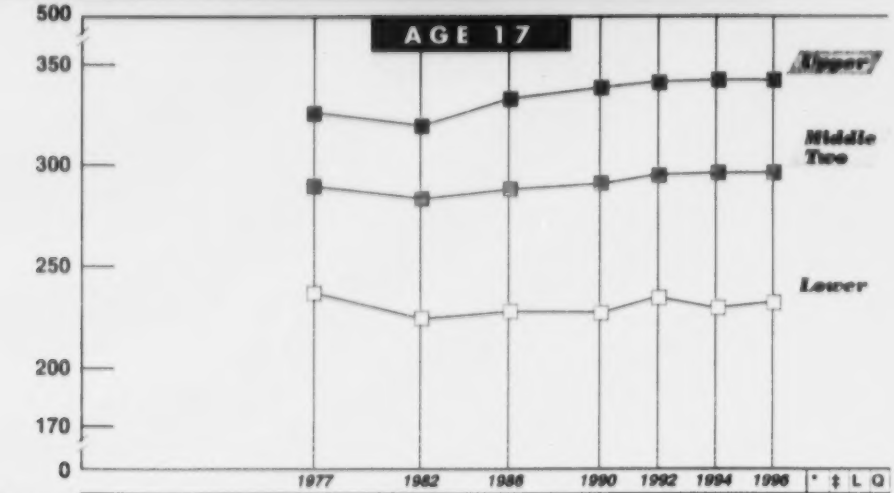
Figure 1.3 depicts the average science scale scores of 9-, 13-, and 17-year-old students who were in the upper quartile (upper 25 percent), middle two quartiles (middle 50 percent), and the lower quartile (lower 25 percent) of student performance in each assessment. As would be expected, standard errors are somewhat smaller for these more homogeneous groups than for the total group. (Please note that these trends are not extrapolated back to 1969 or 1970.)

Analyses by quartiles provide information on trends in science scores for students who are at the upper as well as lower points of the distribution of scores. This demonstrates whether overall gains or losses were evident across the full range of performance in science, or whether the results were particular to certain achievement groups. This information is especially relevant in light of one objective of Goal 3 of The National Education Goals, which states that "the academic performance of elementary and secondary students will increase significantly in every quartile . . ."[11], emphasizing that students of all abilities should be granted access to educational opportunities and should demonstrate gains in educational achievement.

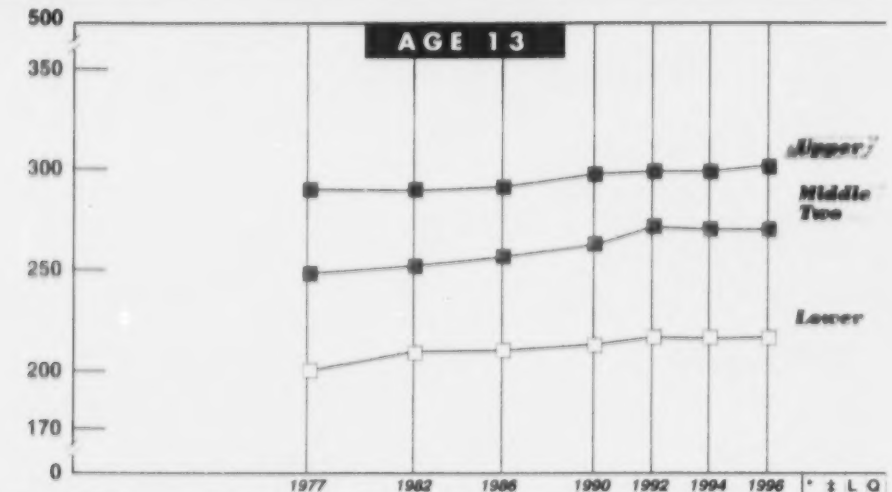
For 17-year-olds in the upper quartile, a positive linear trend indicated an overall pattern of increasing scores from 1977 to 1996. For 17-year-olds in the middle two quartiles, average scores decreased between 1977 and 1982 and then increased, resulting in an overall pattern of improved performance. For both quartile groups, average scores in 1996 were higher than those in 1977. The average score of 17-year-olds in the lower quartile declined after the 1977 assessment, and then changed little until 1992 when it recovered slightly. The average score in 1996, however, was not significantly different from that in 1977. Among 13-year-olds in each quartile group, an overall pattern of increasing scores was observed. For students in the lower quartile, an increase in scores from 1977 to 1992 was followed by stable performance. In all three performance groups, the average scores for 13-year-olds were higher in 1996 than in 1977. The average scores of 9-year-olds in each performance range showed an overall pattern of increases across the assessment years. For all three quartile groups, average scores in 1996 were significantly higher than scores in 1977.

[11] National Education Goals Panel (1996). *The national education goals report: Building a nation of learners.* Washington, DC: U. S. Government Printing Office.

Figure 1.3 Trends in Average Science Scale Scores by Quartile, 1977 to 1996



	1977	1982	1986	1990	1992	1994	1996	*	‡	L	Q
Upper Quartile	334 (0.9)	329 (1.0)	340 (1.1)	344 (0.7)	346 (0.7)	347 (0.9)	347 (1.7)	+		+	
Middle Two	291 (0.5)	286 (0.7)	290 (0.7)	292 (0.7)	295 (1.0)	296 (0.7)	296 (0.9)	+		+	+
Lower Quartile	242 (0.8)	232 (1.3)	235 (1.3)	234 (1.2)	240 (1.9)	236 (1.7)	238 (1.5)				+



	1977	1982	1986	1990	1992	1994	1996	*	‡	L	Q
Upper Quartile	291(0.5)	291(0.9)	292(1.1)	297(0.7)	298(1.0)	298(1.2)	300(1.1)	+		+	
Middle Two	249(0.6)	251(0.6)	252(0.7)	256(0.6)	260(0.5)	259(0.7)	259(0.6)	+		+	
Lower Quartile	201(0.8)	208(0.8)	209(0.9)	211(1.2)	214(0.8)	214(1.3)	214(0.9)	+		+	–

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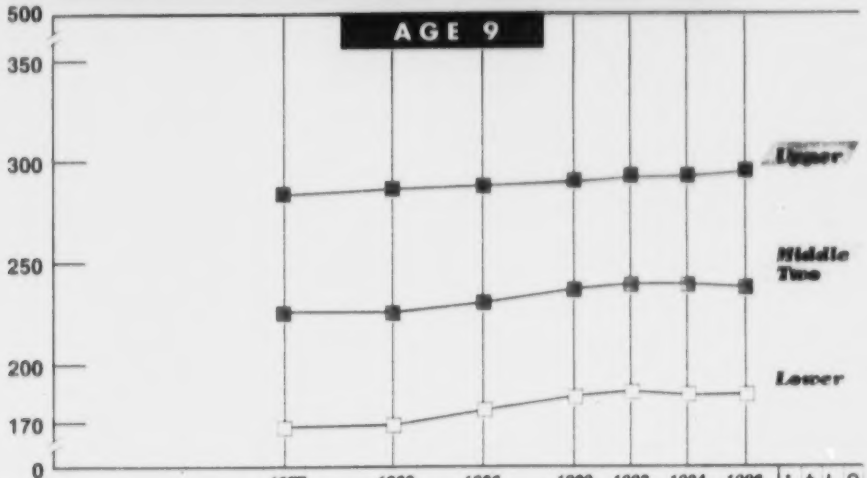
Figure 1.3 (continued)

Trends in Average Science Scale Scores by Quartile, 1977 to 1996



	1977	1982	1986	1990	1992	1994	1996	*	‡	L	Q
Upper Quartile	266(0.9)	268(1.8)	269(1.2)	271(0.8)	273(1.2)	273(1.0)	275(1.1)	+		+	
Middle Two	222(0.5)	222(1.1)	226(0.6)	231(0.5)	233(0.7)	233(1.1)	232(1.1)	+		+	
Lower Quartile	170(1.1)	171(2.0)	177(1.0)	182(0.9)	184(1.2)	183(1.2)	183(1.3)	+		+	

Standard errors of the estimated scale scores appear in parentheses.

* Indicates that the average scale score in 1996 is significantly larger (+) or smaller (–) than that in 1977.

‡ Indicates that the average scale score in 1996 is significantly larger (+) or smaller (–) than that in 1994.

L Indicates that the positive (+) or negative (–) linear trend is significant.

Q Indicates that the positive (+) or negative (–) quadratic trend is significant.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Trends in Science Scale Scores by Race/Ethnicity from 1969-70 to 1996

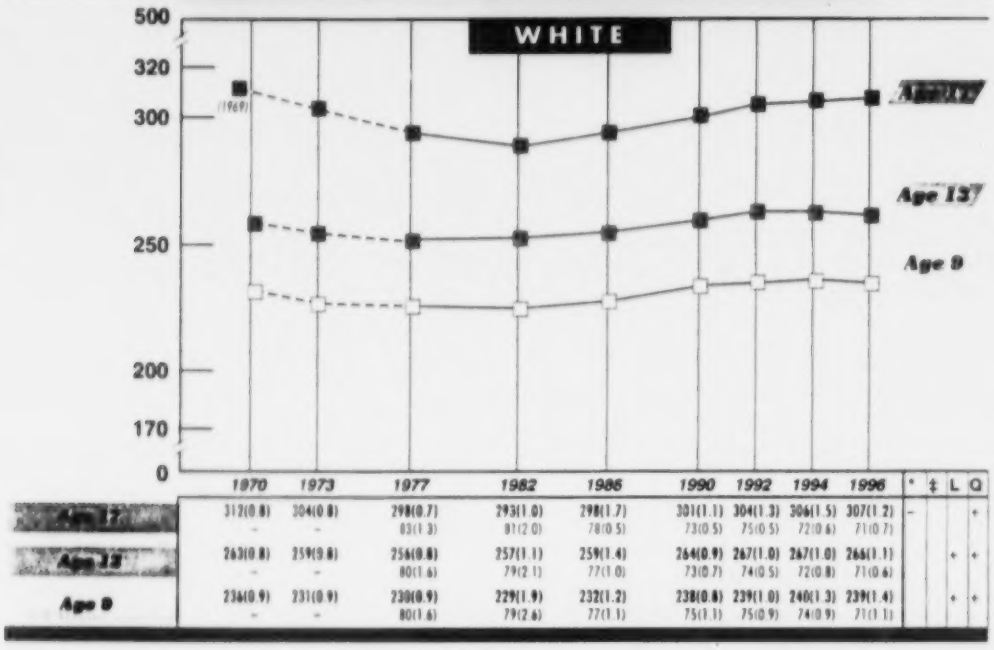
Shown in Figure 1.4 are the trends in average science scale scores for White, Black, and Hispanic students.

White Students. The average scores of White 17-year-olds showed a pattern of decline from 1969 to 1982, followed by a period of improvement. Despite the gains made, the average score for 17-year-olds in 1996 was lower than that in 1969. In general, the overall trends for 9- and 13-year-old White students were characterized by periods of decline during the 1970s followed by recovery periods in the 1980s. Despite the overall pattern of improvement across the assessment years, average scores in 1996 were not significantly different from those in 1970.

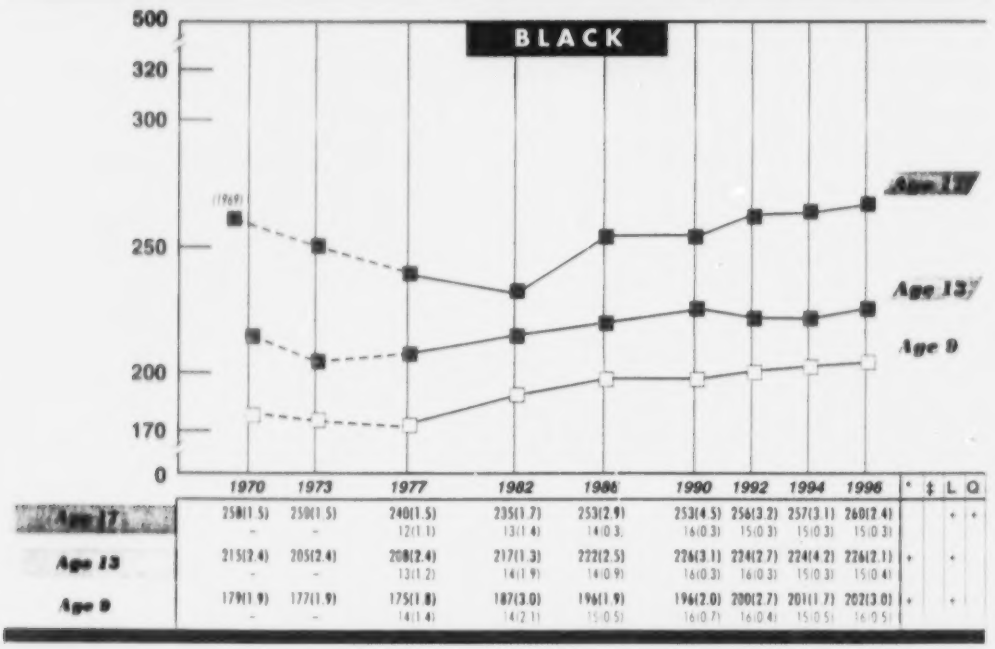
Black Students. Among 17-year-old Black students, a decline in average scores between 1969 and 1982 was followed by an increased performance. Although the overall trend was positive, the average score of these students in 1996 was not significantly different from that of their counterparts in 1969. Despite some fluctuations, the overall trend for Black 9- and 13-year-olds showed a pattern of rising scores between 1970 and 1996. In 1996, the average scores of 9- and 13-year-old students were higher than those in 1970.

Hispanic Students. Despite some fluctuations, the trend for 17-year-olds indicated overall improvement across the assessment years. Nevertheless, no significant difference was found between the 1977 and 1996 average scores of Hispanic 17-year-olds. An overall pattern of improved performance was found for Hispanic 9- and 13-year-old students. (Note that science scale scores were not extrapolated back to 1970 for Hispanic students.) For both age groups, the 1996 average score was higher than the average score in 1977.

Figure 1.4 Trends in Average Science Scale Scores by Race/Ethnicity, 1969-70 to 1996



	1970	1973	1977	1982	1986	1990	1992	1994	1996	*	‡	L	Q
Age 17	312(0.8)	304(0.8)	298(0.7)	293(1.0)	298(1.7)	301(1.1)	304(1.3)	306(1.5)	307(1.2)	-			+
	-	-	03(1.3)	01(2.0)	78(0.5)	73(0.5)	75(0.5)	72(0.6)	71(0.7)				
Age 13	263(0.8)	259(0.8)	256(0.8)	257(1.1)	259(1.4)	264(0.9)	267(1.0)	267(1.0)	266(1.1)			+	+
	-	-	80(1.6)	79(2.1)	77(1.0)	73(0.7)	74(0.5)	72(0.8)	71(0.6)				
Age 9	236(0.9)	231(0.9)	230(0.9)	229(1.9)	232(1.2)	238(0.8)	239(1.0)	240(1.3)	239(1.4)			+	+
	-	-	80(1.6)	79(2.6)	77(1.1)	75(1.1)	75(0.9)	74(0.9)	71(1.1)				



	1970	1973	1977	1982	1986	1990	1992	1994	1996	*	‡	L	Q
Age 17	258(1.5)	250(1.5)	240(1.5)	235(1.7)	253(2.9)	253(4.5)	256(3.2)	257(3.1)	260(2.4)			+	+
	-	-	12(1.1)	13(1.4)	14(0.3.	16(0.3)	15(0.3)	15(0.3)	15(0.3)				
Age 13	215(2.4)	205(2.4)	208(2.4)	217(1.3)	222(2.5)	226(3.1)	224(2.7)	224(4.2)	226(2.1)	+		+	
	-	-	13(1.2)	14(1.9)	14(0.9)	16(0.3)	16(0.3)	15(0.3)	15(0.4)				
Age 9	179(1.9)	177(1.9)	175(1.8)	187(3.0)	196(1.9)	196(2.0)	200(2.7)	201(1.7)	202(3.0)	+		+	
	-	-	14(1.4)	14(2.1)	15(0.5)	16(0.7)	16(0.4)	15(0.5)	16(0.5)				

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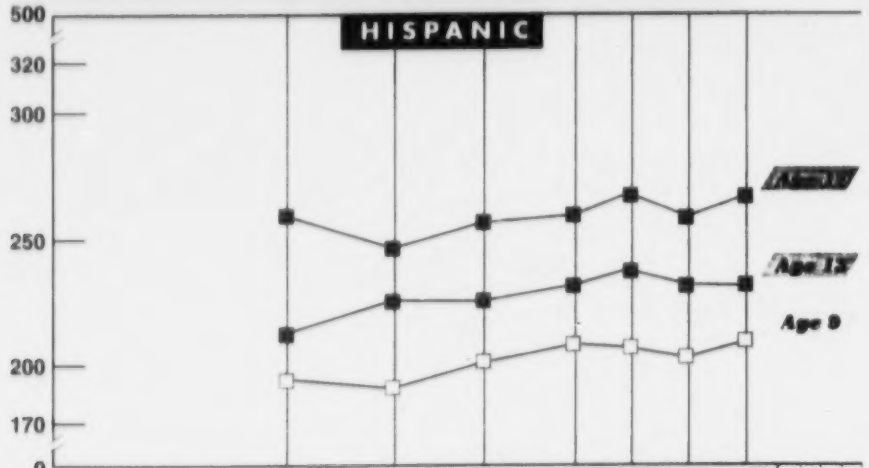
Figure 1.4 (continued)

Trends in Average Science Scale Scores by Race/Ethnicity, 1969-70 to 1996



	1977	1982	1986	1990	1992	1994	1996	*	‡	L	Q
Age 17	262(2.2) 4(0.9)	249(2.3) 5(1.1)	259(3.8) 6(0.3)	262(4.4) 7(0.4)	270(5.6) 7(0.5)	261(6.7) 9(0.3)	269(3.3) 9(0.7)			+	
Age 13	213(1.9) 5(1.1)	226(3.9) 5(1.0)	226(3.1) 7(1.1)	232(2.6) 7(0.5)	238(2.6) 7(0.5)	232(2.4) 8(0.4)	232(2.5) 9(0.7)	+		+	
Age 9	192(2.7) 5(0.9)	189(4.2) 5(1.3)	199(3.1) 6(1.1)	206(2.2) 6(0.6)	205(2.8) 6(0.8)	201(2.7) 6(0.4)	207(2.8) 8(1.0)	+		+	

Below each average scale score, the corresponding percentage of students is presented.

Standard errors of the estimated scale scores and percentages appear in parentheses.

[- - -] Extrapolated from previous NAEP analyses.

* Indicates that the average scale score in 1996 is significantly larger (+) or smaller (–) than that in 1969-70 (for White and Black students) or in 1977 (for Hispanic students).

‡ Indicates that the average scale score in 1996 is significantly larger (+) or smaller (–) than that in 1994.

L Indicates that the positive (+) or negative (–) linear trend is significant.

Q Indicates that the positive (+) or negative (–) quadratic trend is significant.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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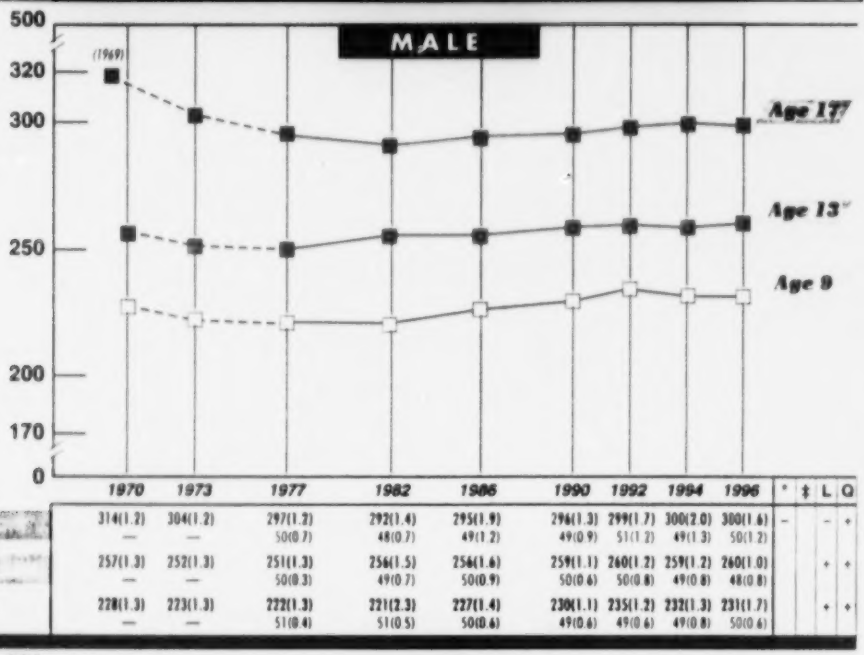
Trends in Science Scale Scores by Gender from 1969-70 to 1996

Figure 1.5 shows trends in average science scale scores for male and female students at all three ages.

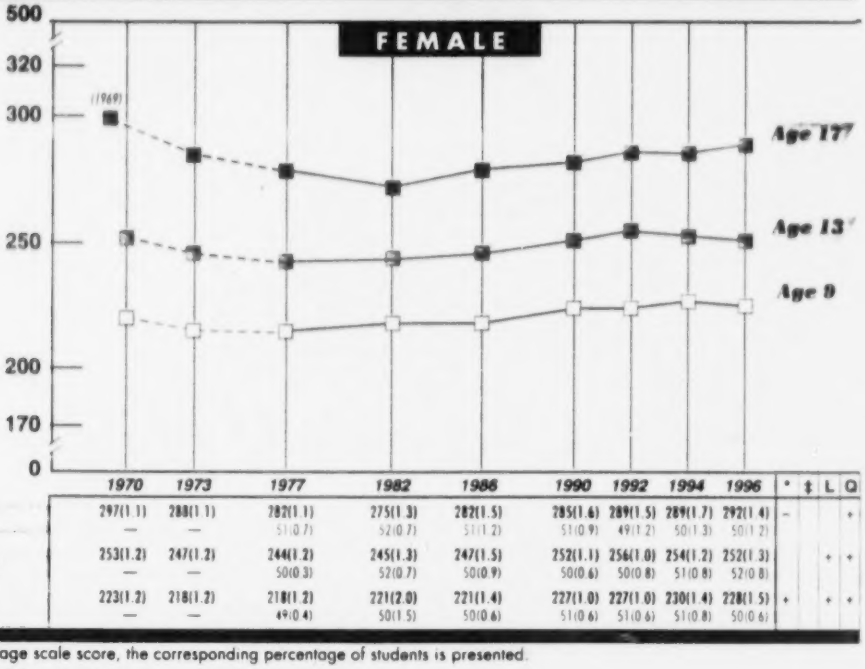
Male Students. Among 17-year-old males, average science scores declined between 1969 and 1982. Although gains have been made since that time, the overall trend was one of decreased performance and the 1996 average score was lower than the 1969 average. Despite an initial period of decline in the 1970s, the performance of 9- and 13-year-old males improved over the assessment years. However, average science scores in 1996 did not differ significantly from those in 1970.

Female Students. From 1969 until 1982, science scores for 17-year-old females declined, then subsequently rose. As with 17-year-old males, however, the 1996 average score for females was still below the average of 27 years earlier. For 9- and 13-year-old female students, trend analyses revealed an overall pattern of improved performance. Among 13-year-olds, declining performance during the 1970s was followed by a recovery period in the 1980s. For 9-year-olds the overall pattern is similar, except that the gains made during the 1980s resulted in an average score in 1996 that was higher than the average in 1970.

Figure 1.5 Trends in Average Science Scale Scores by Gender, 1969-70 to 1996



	1970	1973	1977	1982	1986	1990	1992	1994	1996	*	‡	L	Q
Age 17	314(1.2)	304(1.2)	297(1.2)	292(1.4)	295(1.9)	296(1.3)	299(1.7)	300(2.0)	300(1.6)	–		–	+
	—	—	50(0.7)	48(0.7)	49(1.2)	49(0.9)	51(1.2)	49(1.3)	50(1.2)				
Age 13	257(1.3)	252(1.3)	251(1.3)	256(1.5)	256(1.6)	259(1.1)	260(1.2)	259(1.2)	260(1.0)			+	+
	—	—	50(0.3)	49(0.7)	50(0.9)	50(0.6)	50(0.8)	49(0.8)	48(0.8)				
Age 9	228(1.3)	223(1.3)	222(1.3)	221(2.3)	227(1.4)	230(1.1)	235(1.2)	232(1.3)	231(1.7)			+	+
	—	—	51(0.4)	51(0.5)	50(0.6)	49(0.6)	49(0.6)	49(0.8)	50(0.6)				



	1970	1973	1977	1982	1986	1990	1992	1994	1996	*	‡	L	Q
Age 17	297(1.1)	288(1.1)	282(1.1)	275(1.3)	282(1.5)	285(1.6)	289(1.5)	289(1.7)	292(1.4)	–			+
	—	—	51(0.7)	52(0.7)	51(1.2)	51(0.9)	49(1.2)	50(1.3)	50(1.2)				
Age 13	253(1.2)	247(1.2)	244(1.2)	245(1.3)	247(1.5)	252(1.1)	256(1.0)	254(1.2)	252(1.3)			+	+
	—	—	50(0.3)	52(0.7)	50(0.9)	50(0.6)	50(0.8)	51(0.8)	52(0.8)				
Age 9	223(1.2)	218(1.2)	218(1.2)	221(2.0)	221(1.4)	227(1.0)	227(1.0)	230(1.4)	228(1.5)	+		+	+
	—	—	49(0.4)	50(1.5)	50(0.6)	51(0.6)	51(0.6)	51(0.8)	50(0.6)				

Below each average scale score, the corresponding percentage of students is presented.

Standard errors of the estimated scale scores and percentages appear in parentheses.

[– – –] Extrapolated from previous NAEP analyses.

* Indicates that the average scale score in 1996 is significantly larger (+) or smaller (–) than that in 1969-70.

‡ Indicates that the average scale score in 1996 is significantly larger (+) or smaller (–) than that in 1994.

L Indicates that the positive (+) or negative (–) linear trend is significant.

Q Indicates that the positive (+) or negative (–) quadratic trend is significant.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Trends in Differences in Average Science Scale Scores by Race/Ethnicity and by Gender

The previous sections discussed trends in science achievement for students of different racial/ethnic and gender groups. NAEP studies, as well as other academic assessments, have commonly found higher average achievement in science for White students compared to their minority peer groups, and for males compared to females.[12] The size of the performance gaps between the groups, and the trends in these differences, are matters of considerable interest. Trends in score differences help shed light on whether the gaps between racial/ethnic and between gender groups are increasing, decreasing, or staying the same over time. As with past NAEP assessments, significant performance differences were observed in the 1996 trend assessment among racial/ethnic subgroups and between males and females. Trends in the differences between the average science scores of selected subgroups of students are displayed in Figure 1.6.

A number of factors should be considered when interpreting achievement differences between subgroups. For example, some research has suggested that many minority students attend schools that limit their "opportunity to learn" by providing substandard physical facilities, fewer academic resources, and less challenging curricula.[13] Others have argued that disproportionate numbers of minority students are placed in low-ability classes that provide them with less intensive curricula.[14] Furthermore, some research points to discrepancies in background characteristics, such as socioeconomic status and home resources, as well as supportive learning environments, to explain differences between the academic achievement of racial/ethnic subgroups.[15] Gender differences in science performance may be related to

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[12] Campbell, J. R., Reese, C. M., O'Sullivan, C., & Dossey, J. A. (1996). *NAEP 1994 trends in academic progress.* National Center for Education Statistics. Washington, DC: U. S. Government Printing Office.

Jones, L. R., Mullis, I. V. S., Raizen, S. A., Weiss, I. R., & Weston, E. A. (1992). *The 1990 science report card: NAEP's assessment of fourth, eighth, and twelfth graders.* National Center for Education Statistics. Washington, DC: U. S. Government Printing Office.

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[13] Fine, M. (1991). Framing dropouts. Albany, NY: State University of New York Press.

MacIver, D. J., & Epstein, J. L. (1990). How equal are opportunities for learning in disadvantaged and advantaged middle grade schools? (Report No. 7). Center for Research on Effective Schooling for Disadvantaged Students. Baltimore, MD: Johns Hopkins University.

Oakes, J. (1990). Opportunities, achievement, and choice: Women and minority students in science and mathematics. *Review of Educational Research, 16.*

Stevens, F. (1993). *Opportunity to learn: Issues of equity for poor and minority students.* Washington, DC: National Center for Education Statistics.

[14] King, S.H. (1993). The limited presence of African-American teachers. Review of Educational Research, 63, 115-149.

Meier, K. J., Stewart, J. Jr., & England, R. E. (1989). *Race, class, and education: The politics of second generation discrimination.* Madison, WI: The University of Wisconsin Press.

Pink, W. T. (1982). Academic failure, students' social conflict, and delinquent behavior. *The Urban Review, 14,* 141-130.

[15] Peng, S. (1995). *Understanding racial-ethnic differences in secondary science and mathematics achievement.* National Science Foundation. Washington, DC: National Center for Education Statistics.

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different course-taking patterns and less favorable attitudes toward science among females.[16] Other research has found that many parents and teachers hold lower expectations for females' success in science classes, and that females are given less encouragement to enroll in advanced science courses, are not called on as frequently in science class, and have fewer female role models.[17]

These factors are consistent with other research that has used NAEP results to explore differences in performance between racial groups.[18] Recent arguments demonstrate that reporting unadjusted differences among racial groups may be misleading since these groups come from different family, school, and community contexts that are related to achievement. When achievement results are controlled for social context, test score differences between groups may be reduced.[19] Other research shows that while a substantial performance gap still exists, the performance difference between non-Hispanic White 13- and 17-year-olds and their Hispanic and Black peers has narrowed between 1975 and 1990. Gains among Black and Hispanic students, however, could not be explained by changing family characteristics (parental education level, family size, family income) alone.[20]

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[16] Jones, L. R., Mullis, I. V. S., Raizen, S. A., Weiss, I. R., & Weston, E. A. (1992). *The 1990 science report card: NAEP's assessment of fourth, eighth, and twelfth graders.* National Center for Education Statistics. Washington, DC: U. S. Government Printing Office.

[17] Kahle, J. B., & Lakes, M. K. (1983). The myth of equality in science classrooms. *Journal of Research in Science Teaching, 20,* 131-140.

Linn, M. C., & Hyde, J. S. (1989). Gender, mathematics, and science. *Educational Researcher, 18(8),* 17-27.

Oakes, J. (1990). Opportunities, achievement, and choice: Women and minority students in science and mathematics. *Review of Research in Education, 16.*

[18] Berends, M., & Koretz, D. M. (1995). Reporting minority students' test scores: How well can the National Assessment of Educational Progress account for differences in social context? *Educational Assessment, 3(3),* 249-285.

Jaynes, G. D., & Williams, R. M. Jr. (Eds.), (1989). *A common destiny: Blacks and American society.* National Academy Press: Washington, DC.

Grissmer, D.W., Kirby, S. N., Berends, M., & Williamson, S. (1994). *Student achievement and the changing American family.* Santa Monica, CA: Rand.

[19] Berends, M., & Koretz, D. M. (1995). op. cit.

[20] Grissmer, D.W., Kirby, S. N., Berends, M., & Williamson, S. op. cit.

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Figure 1.6 Trends in Differences in Average Science Scale Scores by Race/Ethnicity and Gender

Standard errors of the estimated scale score differences appear in parentheses.

* Indicates that the average scale score difference in 1996 is significantly larger (+) or smaller (–) than that in 1969-70 (for White vs. Black student and Male vs. Female student differences) or from 1977 (for White vs. Hispanic student differences).

‡ Indicates that the average scale score difference in 1996 is significantly larger (+) or smaller (–) than that in 1994.

L Indicates that the positive (+) or negative (–) linear trend is significant.

Q Indicates that the positive (+) or negative (–) quadratic trend is significant.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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White-Black. In 1996, at all three age groups, White students outperformed Black students. Trend analyses revealed a narrowing gap between White and Black students' average science scores across the assessment years for each age group. For 17-year-olds, this narrowing was largely due to an 18-point gain by Black students between 1982 and 1986, compared to a 5-point gain by White students during the same time period. The 1969 and 1996 scale score gaps are significantly different. However, there has been little change in the size of the White-Black gap between 1986 and 1996. The score gap between White and Black 13-year-old students declined between 1970 and 1986, and changed little during the 1990s. As a result, the 1996 score difference was smaller than the 1970 difference. Again, this decline was due to an increase in Black students' scores from 1973 to 1986, while White students' scores remained relatively stable. Among 9-year-olds, the trend in score differences is similar. The gap in scores between White and Black students declined between 1970 and 1986, and changed little since that time. The size of the gap was smaller in 1996 than in 1970. The reason for the gap reduction for 9-year-olds was improved performance among Black students between 1977 and 1986, while White students' performance changed little during this time.

White-Hispanic. In 1996, at all three ages, White students outperformed Hispanic students. For both 9- and 17-year-old students, trend analyses across the assessment years 1977 to 1996 revealed no overall change in the average score gaps between White and Hispanic students. Direct comparisons of the 1977 and 1996 score gaps showed no statistically significant difference for either age group. Among 13-year-olds, there was some evidence that the difference in average scale scores between White and Hispanic students decreased between 1977 and 1982, but the gap has changed little since that time. The gap in scores between White and Hispanic students remains smaller in 1996 than in 1977.

Male-Female. In 1996, male 13- and 17-year-olds had higher average science scores than did their female peers. The difference in average scores between 17-year-old male and female students declined over the assessment years due primarily to a decrease that occurred after 1982. This reduction in the gap resulted from a 14-point gain for female students between 1982 and 1992, while scores for males increased by 7 points during that same time period. The difference between males and females in 1996 was smaller than the difference in 1969. Among 13-year-olds, trend analyses across the assessment years 1970 to 1996 showed evidence of a widening gap between males and females from 1970 to 1982. The gap then narrowed somewhat until 1992, but appears to have widened again in the last two assessments. The score gap in 1996 did not differ significantly from that in 1970. Despite some fluctuation among 9-year-olds across the assessments, there was no significant change in the magnitude of the differences between male and female students' average scores.

Trends in Science Scale Scores by Region from 1969-70 to 1996

Given the diversity among school districts across the United States, it is interesting to explore trends within separate regions of the country. These data reveal the changes that have occurred in the last 27 years for students in different areas of the country — Northeast, Southeast, Central, and West — and demonstrate whether overall performance gains or losses in science were similar for different geographic regions. Figure 1.7 depicts trends in average science scale scores by region.

Northeast. For 17-year-olds in the Northeast, science scores decreased between 1969 and 1982, but have since increased. Despite these gains, the average score in 1996 was still below the average in 1969. For 13-year-olds, there were no significant changes between 1970 and 1996. However, the average score in 1996 was lower than in 1994. Nine-year-olds showed early declines followed by subsequent gains in science performance. Although the overall trend is positive, the 1996 average score did not differ significantly from the 1970 average score.

Southeast. The average score of 17-year-olds in the Southeast decreased in the 1970s. Despite subsequent gains, the average score in 1996 did not differ significantly from the average in 1969. For 9- and 13-year-old students, an overall pattern of increased performance was observed. For both age groups, average scores in 1996 were higher than those in 1970.

Central. Among 17-year-olds in the Central region, the average science score declined from 1969 to 1982, but has since increased. The 1996 average score was not significantly different from that in 1969; further, although the observed 1996 average was about 10 points higher than the observed 1994 average, this difference was not statistically significant. For 13-year-olds, science scores decreased from 1970 to 1986, then increased. For 9-year-olds, science scores declined in the 1970s, then increased. For both 9- and 13-year-olds, the trend analyses revealed an overall pattern of improvements; however, the average scores for both age groups in 1996 were not significantly different from those in 1970.

West. Decreasing scores were observed for 17-year-olds in the West from 1969 to 1982, followed by increasing scores in the 1980s. However, the overall trend was one of decreasing performance and the 1996 average score for these students continued to be lower than the average score of their counterparts in 1969. The overall pattern of performance for 9- and 13-year-olds was one of improved performance. Despite small gains across the assessment years, the 1970 and 1996 average scores did not differ significantly for either age group.

A comparison of the 1996 average scores of students from different regions revealed that, for both 13- and 17-year-olds, students in the Central region outperformed their peers in the Southeast and West. Thirteen-year-olds in the Central region also had higher average scores than students in the Northeast. No regional differences were observed for 9-year-olds.

Figure 1.7

Trends in Average Science Scale Scores by Region, 1969-70 to 1996

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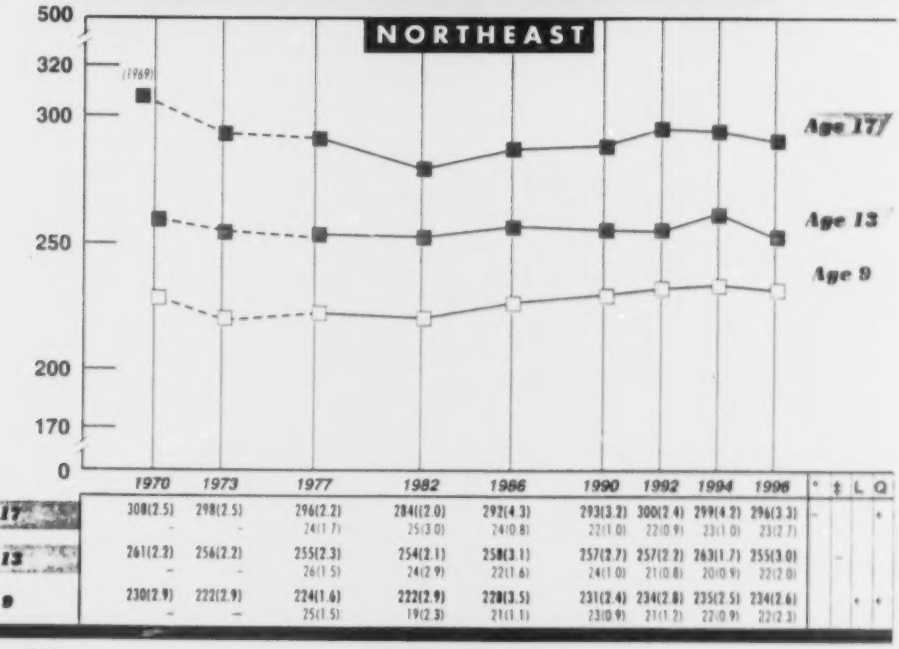
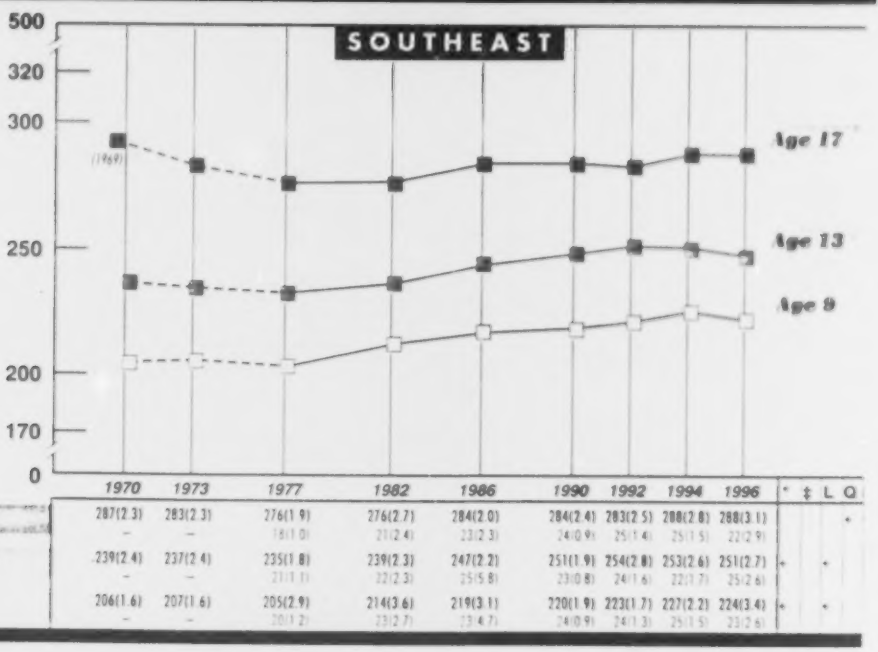


	1970	1973	1977	1982	1986	1990	1992	1994	1996	*	‡	L	Q
Age 17	308(2.5)	298(2.5)	296(2.2)	284((2.0)	292(4.3)	293(3.2)	300(2.4)	299(4.2)	296(3.3)	–			+
	–	–	24(1.7)	25(3.0)	24(0.8)	22(1.0)	22(0.9)	23(1.0)	23(2.7)				
Age 13	261(2.2)	256(2.2)	255(2.3)	254(2.1)	258(3.1)	257(2.7)	257(2.2)	263(1.7)	255(3.0)		–		
	–	–	26(1.5)	24(2.9)	22(1.6)	24(1.0)	21(0.8)	20(0.9)	22(2.0)				
Age 9	230(2.9)	222(2.9)	224(1.6)	222(2.9)	228(3.5)	231(2.4)	234(2.8)	235(2.5)	234(2.6)			+	+
	–	–	25(1.5)	19(2.3)	21(1.1)	23(0.9)	21(1.2)	22(0.9)	22(2.3)				



	1970	1973	1977	1982	1986	1990	1992	1994	1996	*	‡	L	Q
Age 17	287(2.3)	283(2.3)	276(1.9)	276(2.7)	284(2.0)	284(2.4)	283(2.5)	288(2.8)	288(3.1)				+
	–	–	15(1.0)	21(2.4)	23(2.3)	24(0.9)	25(1.4)	25(1.5)	22(2.9)				
Age 13	239(2.4)	237(2.4)	235(1.8)	239(2.3)	247(2.2)	251(1.9)	254(2.8)	253(2.6)	251(2.7)	+		+	
	–	–	21(1.1)	22(2.3)	25(5.8)	23(0.8)	24(1.6)	22(1.7)	25(2.6)				
Age 9	206(1.6)	207(1.6)	205(2.9)	214(3.6)	219(3.1)	220(1.9)	223(1.7)	227(2.2)	224(3.4)	+		+	
	–	–	20(1.2)	23(2.7)	23(4.7)	24(0.9)	24(1.3)	25(1.5)	23(2.6)				

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Figure 1.7 (continued)

Trends in Average Science Scale Scores by Region, 1969-70 to 1996

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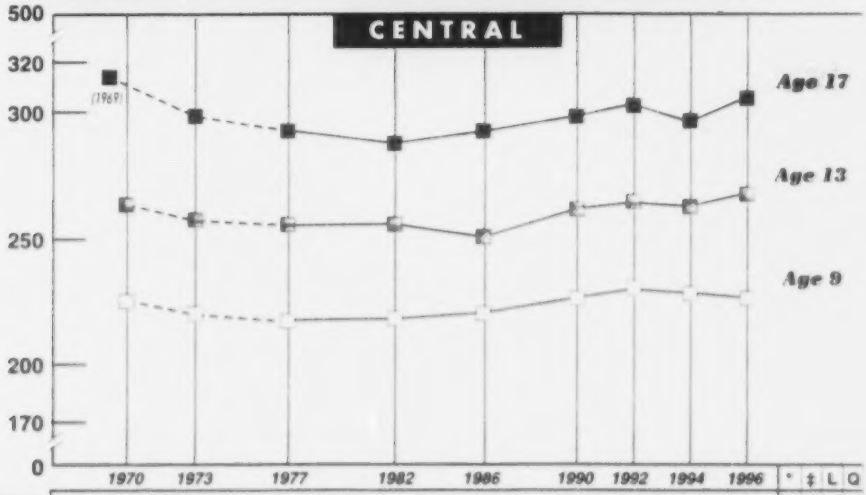
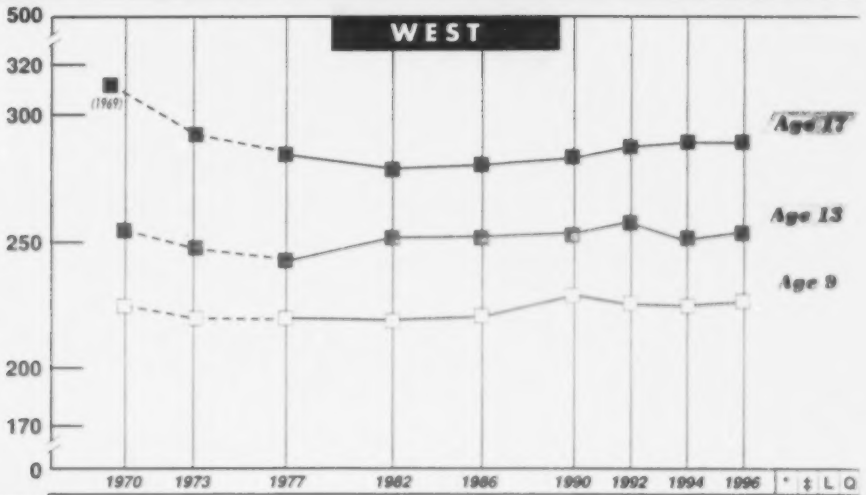


	1970	1973	1977	1982	1986	1990	1992	1994	1996	*	‡	L	Q
Age 17	308(1.9)	300(1.9)	294(1.5)	289(2.6)	294(2.3)	300(3.0)	304(2.7)	298(3.7)	307(2.6)				+
	–	–	33(1.6)	30(3.9)	28(2.2)	26(0.9)	25(1.0)	26(1.1)	25(0.9)				
Age 13	262(1.8)	256(1.8)	254(1.8)	254(2.6)	249(5.3)	260(2.8)	263(2.1)	261(3.5)	266(1.8)			+	+
	–	–	27(1.9)	28(3.9)	25(5.0)	24(0.7)	27(1.0)	27(1.8)	23(1.0)				
Age 9	233(3.0)	228(3.0)	225(2.2)	226(3.5)	228(2.2)	234(1.7)	238(1.8)	236(2.7)	234(2.4)			+	+
	–	–	30(1.9)	30(4.3)	29(4.0)	24(0.6)	28(0.8)	26(1.0)	25(0.9)				



	1970	1973	1977	1982	1986	1990	1992	1994	1996	*	‡	L	Q
	308(1.7)	295(1.7)	287(1.5)	281(2.7)	283(3.8)	286(2.3)	290(3.8)	292(4.1)	292(2.4)	–		–	+
	–	–	24(1.9)	25(2.6)	26(0.9)	28(0.9)	29(0.9)	27(1.0)	30(2.3)				
Age 13	255(1.8)	248(1.8)	243(2.3)	252(2.8)	252(2.7)	253(2.1)	258(1.6)	252(2.1)	254(1.8)			+	
	–	–	26(2.1)	26(2.5)	28(1.5)	29(0.9)	29(0.9)	31(1.1)	30(1.9)				
Age 9	226(2.2)	221(2.2)	221(2.2)	220(4.1)	222(3.2)	230(1.8)	227(2.2)	226(2.7)	228(1.9)			+	
	–	–	25(2.0)	28(2.7)	28(1.6)	28(0.8)	27(0.8)	28(1.0)	30(2.6)				

Below each average scale score, the corresponding percentage of students is presented.

Standard errors of the estimated scale scores and percentages appear in parentheses.

[– – –] Extrapolated from previous NAEP analyses.

* Indicates that the average scale score in 1996 is significantly larger (+) or smaller (–) than that in 1969-70.

‡ Indicates that the average scale score in 1996 is significantly larger (+) or smaller (–) than that in 1994.

L Indicates that the positive (+) or negative (–) linear trend is significant.

Q Indicates that the positive (+) or negative (–) quadratic trend is significant.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Trends in Science Scale Scores by Parents' Highest Level of Education from 1977 to 1996

A consistent predictor of students' achievement is the education level of their parents.[21] In general, students with less-educated parents tend to have lower academic scores than students whose parents have higher levels of educational attainment. Similarly, adults whose parents completed more years of education typically have more advanced literacy skills than those whose parents have fewer years of education.[22]

Figure 1.8 presents trends in average science scores by parents' highest level of education. When one compares the 1996 average science scores for groups of students with different levels of parental education, the results generally reveal higher average science scores for students with higher levels of parental education. This pattern was consistent for all age groups with only two exceptions among 9-year-olds: no significant performance differences were found between students with parents whose highest education level was high school graduation and those whose parents did not graduate from high school, or between students with parents who had graduated from college and those whose parents' highest education level was some education beyond high school.

The percentage of students in each age group who reported that one or both parents had graduated from college increased from 1977 to 1996. Conversely, the percentage of students who reported their parent(s) had less than a high school diploma decreased during this time period for all three age groups. It should be noted that across the trend assessments, approximately one-third of 9-year-olds and one-tenth of 13-year-olds responded "I don't know" to the question about their parents' highest level of education. Furthermore, some research has revealed the potential for young children to provide inaccurate reports about such information.[23]

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[21] National Center for Education Statistics (1990). *A profile of the American eighth grader: NELS:88 student descriptive summary* (NCES 90-458). Washington, DC: U.S. Government Printing Office.

Jones, L. R., Mullis, I. V. S., Raizen, S. A., Weiss, I. R., & Weston, E. A. (1992). *The 1990 science report card: NAEP's assessment of fourth, eighth, and twelfth graders.* National Center for Education Statistics. Washington, DC: U. S. Government Printing Office.

[22] Kirsch, I. S., Jungeblut, A., Jenkins, L., & Kolstad, A. (1993). *Adult literacy in America: A first look at the results of the National Adult Literacy Survey.* National Center for Education Statistics. Washington, DC: U.S. Government Printing Office.

[23] Looker, E. D. (1989). Accuracy of proxy reports of parental status characteristics. *Sociology of Education, 62*(4), 257-276.

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For 17-year-olds with at least one college-educated parent, a decline in science scores between 1977 and 1982 was followed by a period of increases. The average score of 17-year-old students who reported high school graduation as their parents' highest level of education also declined between 1977 and 1982 and has increased since that time. However, the average score for both groups of students in 1996 was not significantly different from the average score in 1977. No overall trends in average scores were observed for 17-year-olds whose parents had not graduated from high school or had some education after high school.

Among 13-year-olds whose parents had not graduated from high school, an overall pattern of increasing scores was observed across the assessment years. However, the average score in 1996 did not differ significantly from that in 1977. The performance of 13-year-olds at other levels of parental education showed no significant linear or quadratic trend over the assessment years.

The average science scores for 9-year-olds who reported that at least one parent graduated from college followed an increasing trend across the assessment years, resulting in a higher average score in 1996 compared to that in 1977. A similar trend was observed for 9-year-olds who reported that neither parent had graduated from high school. No overall trends in average scores were observed for 9-year-olds whose parents' highest level of education was either a high school diploma or some education after high school.

Figure 1.8 Trends in Average Science Scale Scores by Parents' Highest Level of Education, 1977 to 1996

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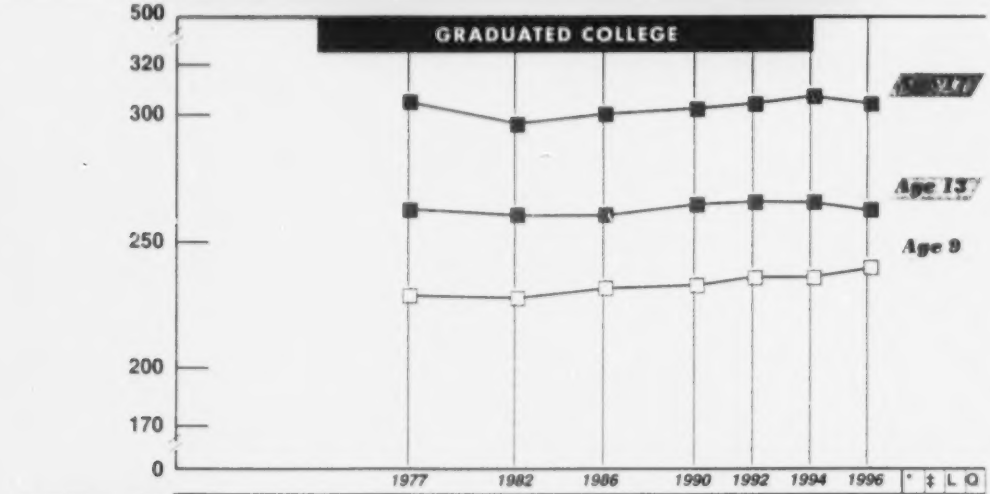
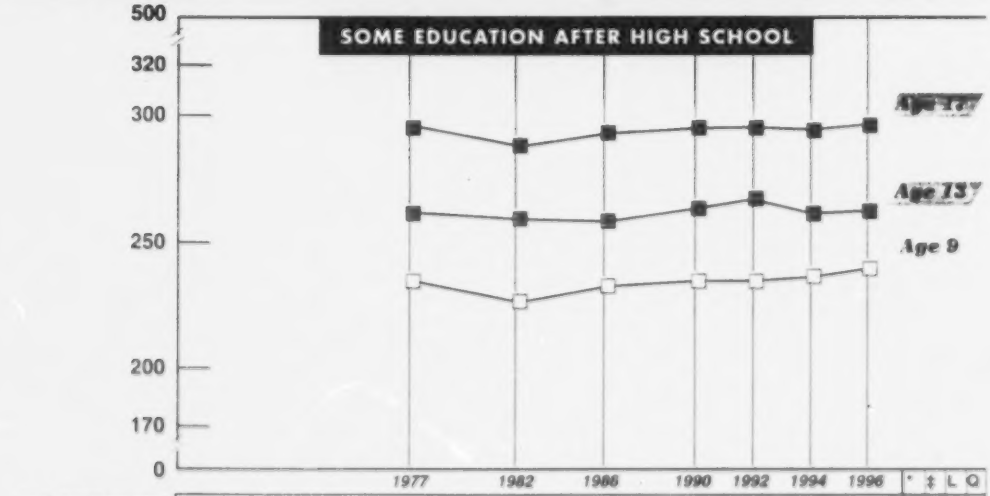


	1977	1982	1986	1990	1992	1994	1996	*	‡	L	Q
Age 17	309(1.0)	300(1.7)	304(2.1)	306(1.7)	308(1.3)	311(1.6)	308(1.5)				+
	30(1.2)	32(1.4)	37(1.2)	39(1.4)	43(1.4)	44(1.5)	46(1.5)				
Age 13	266(1.0)	264(1.5)	264(1.9)	268(1.1)	269(1.0)	269(1.3)	266(1.2)				
	27(1.0)	37(1.5)	38(2.0)	41(1.2)	44(1.3)	46(1.3)	45(1.6)				
Age 9	232(1.4)	231(2.3)	235(1.4)	236(1.3)	239(1.2)	239(1.4)	240(1.6)	+		+	
	23(0.7)	42(2.3)	38(1.1)	40(1.1)	42(1.2)	45(0.8)	43(1.2)				



	1977	1982	1986	1990	1992	1994	1996	*	‡	L	Q
Age 17	296(1.1)	290(1.7)	295(2.5)	297(1.6)	296(1.7)	295(1.9)	297(1.9)				
	17(0.4)	22(0.6)	24(1.0)	24(0.9)	25(0.9)	24(1.1)	24(1.1)				
Age 13	260(1.3)	259(1.5)	258(1.4)	263(1.2)	266(1.1)	260(2.0)	261(1.4)				
	15(0.5)	17(0.6)	16(0.6)	17(0.6)	18(0.7)	17(0.6)	17(0.5)				
Age 9	237(1.5)	229(3.2)	236(2.6)	238(2.1)	237(2.4)	239(2.8)	242(2.9)				
	7(0.3)	9(0.6)	7(0.6)	7(0.4)	9(0.4)	7(0.4)	7(0.6)				

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Figure 1.8 (continued)

Trends in Average Science Scale Scores by Parents' Highest Level of Education, 1977 to 1996

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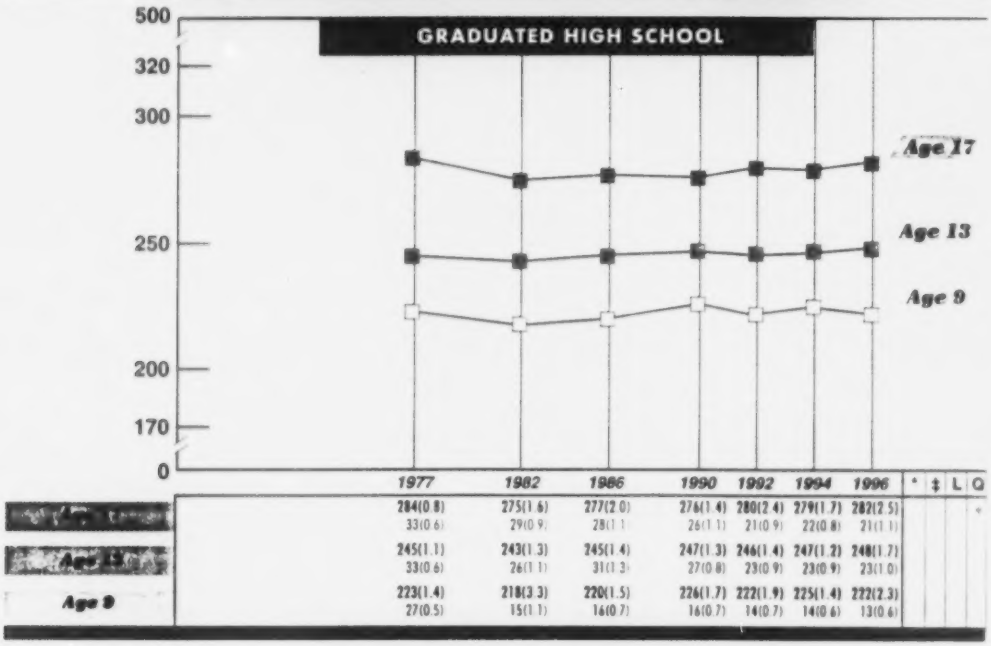

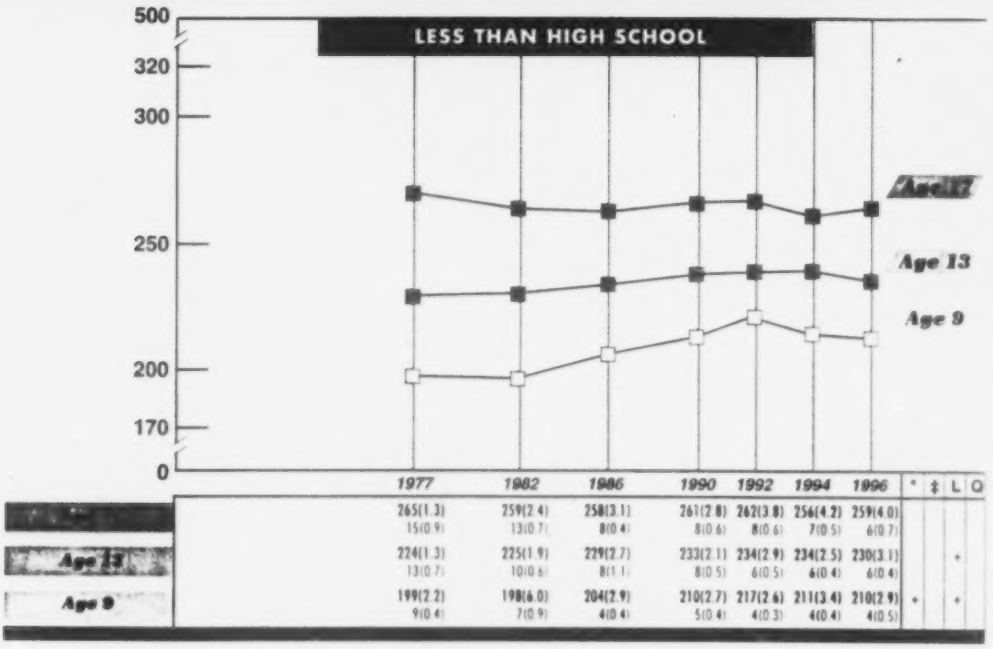

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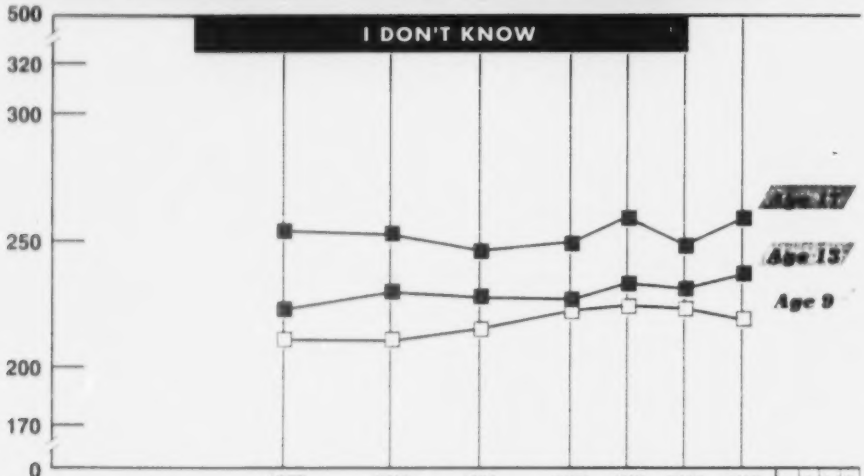
Figure 1.8 (continued)

Trends in Average Science Scale Scores by Parents' Highest Level of Education, 1977 to 1996



	1977	1982	1986	1990	1992	1994	1996	*	‡	L	Q
Age 17	253(3.2)	252(3.9)	245(5.5)	248(5.5)	258(7.4)	247(6.7)	258(8.1)				
	4(0.4)	5(0.8)	3(0.3)	3(0.4)	3(0.3)	3(0.3)	2(0.2)				
Age 13	222(1.8)	229(2.8)	227(2.7)	224(2.1)	232(2.0)	230(2.5)	236(2.3)	+		+	
	13(1.1)	11(1.2)	8(0.4)	8(0.5)	8(0.4)	8(0.5)	10(0.6)				
Age 9	213(1.4)	211(2.8)	215(1.5)	222(1.2)	224(1.4)	223(1.9)	219(1.3)	+		+	
	34(0.7)	29(1.8)	35(1.0)	32(0.8)	33(0.8)	30(0.8)	33(0.9)				

Below each average scale score, the corresponding percentage of students is presented.

Standard errors of the estimated scale scores and percentages appear in parentheses.

* Indicates that the average scale score in 1996 is significantly larger (+) or smaller (–) than that in 1977.

‡ Indicates that the average scale score in 1996 is significantly larger (+) or smaller (–) than that in 1994.

L Indicates that the positive (+) or negative (–) linear trend is significant.

Q Indicates that the positive (+) or negative (–) quadratic trend is significant.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Trends in Science Scale Scores by Type of School from 1977 to 1996

In recent years, there has been considerable interest in comparing the performance of students attending public and nonpublic schools. The public versus private school debate was fueled about 15 years ago by a major report which concluded that students in private schools had higher achievement than public school students.[24] Sampling procedures used for the NAEP long-term trend assessments make it possible to report on the performance of 9-, 13-, and 17-year-old students attending public and nonpublic schools.[25] (Results by type of school are not available for extrapolated data.) Previous NAEP assessments have found that nonpublic school students had higher average science scores than their public school peers.[26]

Inferences about the relative effectiveness of public and nonpublic schools should not be solely based on NAEP results, however. Average performance differences between the two types of schools may be related to socioeconomic and sociological factors such as per-pupil expenditures, academic curricula, course-taking patterns, disciplinary climate, and the level of parental aspirations and involvement in students' education.[27] Some research has suggested that differences between the academic performance of students attending public and nonpublic schools are minimal when certain factors are controlled such as parental attitudes, student body stability, level of course work, and general school climate.[28]

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[24] Coleman, J. S., Hoffer, T., & Kilgore, S. (1982). *High school achievement: Public, Catholic, and private schools compared.* Basic Books.

[25] Nonpublic schools include Catholic and other private schools.

[26] Campbell, J. R., Reese, C. M., O'Sullivan, C., & Dossey, J. A. (1996). *NAEP 1994 trends in academic progress.* National Center for Education Statistics. Washington, DC: U.S. Government Printing Office.

[27] Alexander, K. L., & Pallas, A. M. (1983). Private schools and public policy: New evidence on cognitive achievement in public and private schools. *Sociology of Education, 56,* 170-182.

Berliner, D., & Biddle, B. (1996). In defense of schools. *Vocational Education Journal, 71*(3), 36-38.

[28] Mullis, I. V. S., Jenkins, F., & Johnson, E. G. (1994). *Effective schools in mathematics: Perspectives from the NAEP 1992 assessment.* National Center for Education Statistics. Washington, DC: U. S. Government Printing Office.

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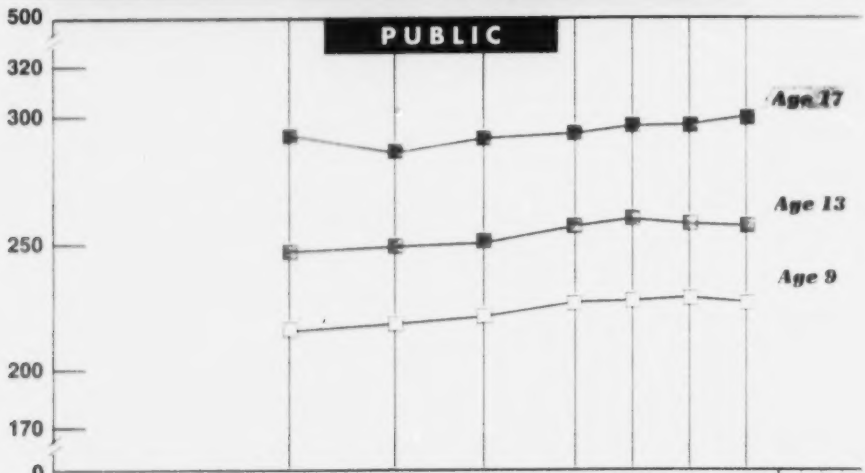
Figure 1.9 contains trend data on the percentages of students attending public and nonpublic schools and their corresponding science scores. The percentages of students attending public and nonpublic schools showed no specific trend over the assessment years. Among 9- and 13-year-olds in 1996, the average science scores of nonpublic school students were higher than those of their public school peers. In contrast, the apparent difference observed between public and nonpublic students at age 17 was not significant.

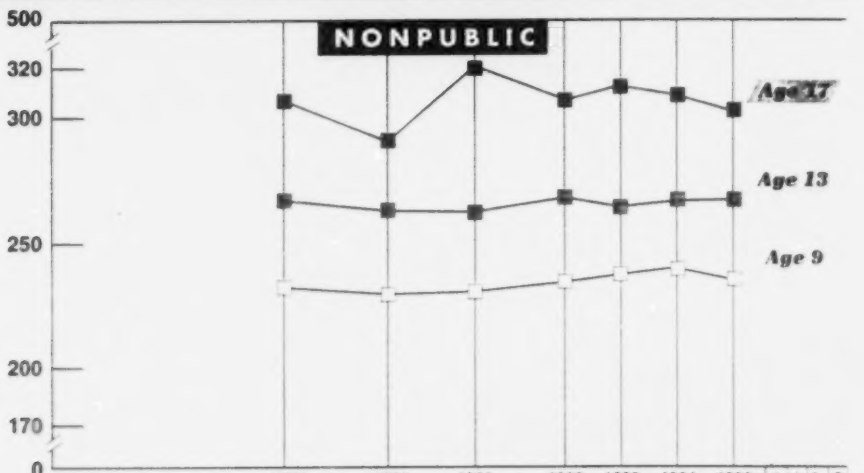
Public School Students. For 17-year-old students in public schools, a decline in average scores was observed between 1977 and 1982. Gains have been made since that time, however, and the overall pattern was one of improved performance. The average scores of 9- and 13-year-old public school students showed a pattern of general increase between 1977 and 1996. For all three age groups, the average score in 1996 was higher than in 1977.

Nonpublic School Students. Despite some fluctuations, no consistent pattern of change was evident across the assessments in the science performance of 13- and 17-year-olds attending nonpublic schools. The average scores of 13- and 17-year-olds in 1996 were not significantly different from the average scores in the 1977 assessment. Nine-year-olds showed a general trend of increasing scores over the assessment years, but there was no significant difference between average scores in 1977 and 1996.

Figure 1.9 Trends in Average Science Scale Scores by Type of School, 1977 to 1996



	1977	1982	1986	1990	1992	1994	1996	*	‡	L	Q
Age 17	288(1.0)	282(1.1)	287(1.6)	289(1.1)	292(1.3)	292(1.5)	295(1.2)	+		+	+
	94(1.8)	90(2.0)	.96(1.4)	93(1.8)	90(2.4)	88(2.3)	91(1.7)				
Age 13	245(1.2)	249(1.4)	251(1.4)	254(1.1)	257(1.0)	255(1.1)	254(1.1)	+		+	
	90(1.4)	89(1.7)	96(1.8)	90(1.4)	88(1.9)	88(1.7)	89(1.8)				
Age 9	218(1.4)	220(2.0)	223(1.4)	228(0.9)	229(1.0)	230(1.4)	228(1.3)	+		+	
	89(1.2)	90(2.3)	84(2.7)	89(2.1)	87(1.6)	88(1.8)	87(1.5)				



	1977	1982	1986	1990	1992	1994	1996	*	‡	L	Q
Age 17	308(2.4)	292(2.9)	321(10.1)	308(6.6)	312(3.7)	310(4.8)	304(5.5)				
	6(1.8)	10(2.0)	4(1.4)	7(1.8)	9(2.1)	12(2.3)	9(1.7)				
Age 13	268(2.1)	264(3.2)	263(6.4)	269(1.8)	265(2.4)	268(2.6)	268(5.0)				
	10(1.4)	11(1.7)	4(1.8)	10(1.4)	12(1.9)	12(1.7)	11(1.8)				
Age 9	235(2.2)	232(3.2)	233(2.9)	237(2.4)	240(2.7)	242(2.8)	238(4.1)			+	
	11(1.2)	10(2.3)	16(2.7)	11(2.1)	13(1.6)	12(1.8)	13(1.5)				

Below each average scale score, the corresponding percentage of students is presented.

Standard errors of the estimated scale scores and percentages appear in parentheses.

* Indicates that the average scale score in 1996 is significantly larger (+) or smaller (–) than that in 1977.

‡ Indicates that the average scale score in 1996 is significantly larger (+) or smaller (–) than that in 1994.

L Indicates that the positive (+) or negative (–) linear trend is significant.

Q Indicates that the positive (+) or negative (–) quadratic trend is significant.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Summary

- The science performance of students in all three age groups declined during the first few assessments, but has since improved. For 9- and 13-year-olds, the overall pattern was one of increasing performance, but for 17-year-olds, the overall pattern was one of decreasing performance. For all three groups, average scores in 1996 were not significantly different from those in 1994. Comparing the average scores in 1996 to those in 1969-70, the 1996 average score was higher for 9-year-olds, did not differ significantly for 13-year-olds, and was lower for 17-year-olds.

- The percentages of 9-year-olds at or above Levels 150, 200, 250, and 300 were higher in 1996 than in 1977. Increases also occurred between 1977 and 1996 in the percentages of 13-year-olds reaching Levels 150, 200, and 250, and in the percentages of 17-year-olds reaching Level 300.

- The average science scores of 9- and 13-year-olds in the upper, middle two, and lower quartiles of the performance distribution increased between 1977 and 1996. This pattern was also observed among 17-year-olds in the upper and middle two quartiles, but not among those in the lower quartile.

- Earlier declines and more recent gains characterize the science performance of 9-, 13-, and 17-year-old White students across the assessment years. The overall pattern for 9- and 13-year-olds was one of increased performance. However, the 1996 average scores for 9- and 13-year-olds were not significantly improved over those in 1970, and the 1996 average for 17-year-old students was below that of their counterparts in 1969. In 1996, the average science scores of 9- and 13-year-old Black students were improved over those in 1970. Despite an overall pattern of increased performance for Black 17-year-olds, their average scores in 1969 and 1996 were not significantly different. For 9-, 13-, and 17-year-old Hispanic students, an overall pattern of improved performance was shown. Average scores in 1996 were higher than those in 1977 for 9- and 13-year-olds, but not for 17-year-olds.

- The average science scores of both male and female students at all ages declined during the early assessments, then increased. For male and female students aged 9 and 13, trend analyses revealed an overall pattern of improved performance. Despite the improvements, the 1996 average scores for 9- and 13-year-old males were not significantly higher than those in 1970. For 9-year-old females, the average score was higher in 1996 than in 1970. There was no significant difference between the 1970 and 1996 average scores for age 13 females. For 17-year-old males and females alike, the average score in 1996 was below that in 1969.

- In 1996, White students in all three age groups continued to outperform their Black and Hispanic peers in science. For all three age groups, the overall trend across the assessments was one of narrowing gaps between White and Black students' average scores. For all three age groups, the gap between Black and White students' average science scores was smaller in 1996 than in 1970. For 9- and 17-year-olds, the difference between White and Hispanic students did not change significantly between 1977 and 1996. The magnitude of the gap in 1996 for 13-year-olds was significantly different from that in the first assessment.

- The average score difference between 9-year-old males and females changed little across the assessments. Despite some fluctuation over time among 13-year-olds, the average score difference in 1996 did not differ from that in 1970. The gaps between the average scores of 17-year-old males and females declined over the years and, as a result, the difference in 1996 was smaller than the difference in 1969.
- In the Northeast and Central regions, average scores for 9-year-olds displayed a pattern of early declines followed by gains. In 1996, the average scores for 9- and 13-year-olds in these regions were not significantly different from those in 1970. Among 17-year-olds, the average score in 1996 for students in the Northeast was below that in 1969. Overall patterns of improvement were observed for 9- and 13-year-old students in the Southeast. Average scores for these groups in 1996 were higher than in 1970. For 17-year-olds in the Southeast, declining scores in the 1970s were followed by score increases, however, the average in 1996 did not differ significantly from that in 1970. In the West, the performance of 9- and 13-year-olds tended to improve across the assessment years, although average scores in 1996 did not differ from those in 1970. In 1996, the average score for 17-year-olds in the West was below the average in the first assessment.
- For each age group, increases from 1977 to 1996 were observed in the percentage of students who reported that one or both parents had graduated from college. The percentage of students who reported that their parent(s) had less than a high school education decreased during this time period for all three groups. An increase in average science scores between 1977 and 1996 was observed for 9-year-olds who reported that at least one parent had graduated from college and for 9-year-olds who reported that neither parent had graduated from high school. An overall pattern of improvement was found for 13-year-olds whose parent(s) did not have a high school diploma. For 17-year-olds with at least one parent who graduated from college and for 17-year-olds whose parents' highest level of education was high school graduation, a pattern of early declines in performance was followed by increases. In general, higher science scores were found for students with higher levels of parental education.
- In 1996, the average science scores of 9- and 13-year-old public school students were significantly below those of their nonpublic school peers. No significant difference was observed between public and nonpublic school 17-year-olds. The average scores of 9-, 13- and 17-year-old public school students showed a pattern of general increase, resulting in an average score in 1996 that was higher than that in 1977. Nine-year-old students attending nonpublic schools showed some improvement over the assessments, but did not have a significantly higher average score in 1996 than in 1977. Little change was observed across the assessments for 13- and 17-year-old nonpublic school students; for each group, the average score in 1996 was not significantly different from that in 1977.

Chapter 2

Students' Experiences in Science

Students need many experiences to become scientifically literate individuals who are ready to meet the challenges of the 21st century. Examples of such experiences include taking various types of science courses in school, being exposed to different modes of teaching and learning, and perceiving the role of science in one's life and in world affairs.[29] This chapter looks at the relationship between self-reported student experiences in science class and average science scale scores. Results from the 1996 trend assessment are compared with results from the first assessment in which information on that experience was collected.

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[29] Commission on Precollege Education in Mathematics, Science, and Technology (1983). *Educating Americans for the 21st century: A report to the American people and the National Science Board.* Washington, DC: National Science Board.

The National Science Foundation (1995/1996). *Statewide systemic initiatives in science, mathematics, and engineering.* Arlington, VA.

Project 2061 (1993). *Benchmarks for science literacy.* Washington, DC: American Association for the Advancement of Science.

Clinton, W. J., & Gore, A. (1994). *Science in the national interest.* Executive Office of the President. Washington, DC: Office of Science and Technology Policy.

National Research Council (1995). *National science education standards.* Washington, DC.

Participation in Scientific Experiments and Use of Equipment at Age 9

The central role of investigation in science teaching and learning has received much attention in recent years.[30] Hands-on experiences and the use of common science instruments are necessary parts of scientific investigation. Nine-year-olds were asked whether they had ever worked on or experimented with real-life scientific objects such as living animals and plants. Students were also asked whether they had ever used specific scientific instruments such as a microscope or thermometer. Table 2.1 compares 1977 and 1996 age 9 students' reported participation in five types of science experiments. Data on students' use of specific instruments are presented in Table 2.2. Average science scale scores are also displayed in the tables.

In 1996, 67 percent of 9-year-old students reported that they had experimented with living plants, which was not significantly different from the 70 percent reported in 1977. In 1996, 43 percent of students indicated that they had experience with living animal experiments. This percentage was decreased from 1977 when 55 percent reported experience with this type of experiment. There was no significant difference between 1977 and 1996 in students' reports of having experimented with batteries and bulbs. About 38 percent of

Table 2.1 **Participation in Scientific Experiments at Age 9, 1977 and 1996**

9-Year-Olds' Reporting on Having Experimented with...	Year	Students Answering "YES"		Students Answering "NO"	
		Percent of Students	Average Scale Score	Percent of Students	Average Scale Score
Living plants	1996	67 (1.5)	234 (2.4) *	28 (1.5)	224 (2.6)
	1977	70 (1.4)	221 (2.3)	27 (1.3)	217 (2.8)
Living animals	1996	43 (1.4) *	227 (2.9) *	53 (1.5) *	233 (2.1)
	1977	55 (1.5)	216 (2.8)	42 (1.3)	227 (2.1)
Batteries and bulbs	1996	52 (2.2)	234 (2.9)	41 (2.1)	227 (2.8) *
	1977	51 (1.4)	225 (2.8)	43 (1.4)	217 (2.1)
Shadows	1996	38 (1.7)	233 (2.9) *	54 (1.9)	231 (2.4) *
	1977	42 (1.6)	222 (3.1)	55 (1.7)	220 (1.9)
Dissolving things in water	1996	64 (1.7)	235 (2.6) *	28 (1.4)	225 (2.6) *
	1977	69 (1.4)	223 (2.0)	26 (1.2)	215 (2.6)

Standard errors of the estimated percentages and scale scores appear in parentheses.

Percentages may not total 100 because a small percentage of students responded "not certain" to each item.

* Indicates that the percentage or average scale score in 1996 is significantly different than that in 1977.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

[30] National Research Council (1995). National science education standards. Washington, DC.

Project 2061 (1993). *Benchmarks for science literacy*. Washington, DC: American Association for the Advancement of Science.

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9-year-old students in 1996 reported having experience with shadow experiments; this result did not differ significantly from the percentage reported in 1977. Likewise, the percentage of 9-year-olds who had participated in experiments involving dissolving things in water showed no significant change between 1977 and 1996.

In 1996, students who reported having worked with living plants and dissolving things in water had higher average science scores than students without these experiences. No significant score differences were found between 9-year-olds with and without experience experimenting with shadows, living animals, or batteries and bulbs.

Regarding the use of scientific equipment, most 9-year-olds in 1996 reported that they had used a thermometer (91 percent) and a calculator (97 percent), and 73 and 77 percent indicated they had used a directional compass and stopwatch, respectively. All of these percentages were higher than in 1977. There were no significant differences in the percentages of students in 1996 and 1977 who reported using scales and microscopes.

In 1996, 9-year-olds who answered in the affirmative to each question concerning use of scientific instruments had higher average science scores than those who answered in the negative. (A comparison could not be made between students' responses to the question about calculator use due to the insufficient sample size of students responding "No" in 1996.)

Table 2.2 **Use of Scientific Equipment at Age 9, 1977 and 1996**

THE NATION'S REPORT CARD naep

9-Year-Olds' Reporting on Having Used a...	Year	Students Answering "YES"		Students Answering "NO"	
		Percent of Students	Average Scale Score	Percent of Students	Average Scale Score
Scale to weigh things	1996	89 (0.8)	235 (1.8) *	9 (0.6)	217 (4.0) *
	1977	89 (0.8)	220 (2.3)	9 (0.7)	202 (4.5)
Thermometer	1996	91 (0.8) *	234 (1.8) *	7 (0.7) *	208 (5.1)
	1977	84 (1.0)	222 (2.2)	14 (0.9)	199 (2.7)
Microscope	1996	58 (1.9)	238 (2.2) *	36 (1.7) *	224 (1.8) *
	1977	53 (1.4)	222 (2.5)	43 (1.5)	214 (2.1)
Calculator	1996	97 (0.5) *	233 (1.8) *	2 (0.3) *	*** (***)
	1977	87 (1.2)	222 (2.2)	11 (1.0)	195 (3.4)
Compass	1996	73 (1.1) *	235 (1.8) *	23 (1.1) *	225 (2.6) *
	1977	61 (1.3)	222 (2.3)	33 (1.2)	214 (2.7)
Stopwatch	1996	77 (1.1) *	236 (1.9) *	20 (0.9) *	219 (2.9)
	1977	44 (1.3)	223 (2.6)	49 (1.2)	215 (2.5)

Standard errors of the estimated percentages and scale scores appear in parentheses.

* Indicates that the percentage or average scale score in 1996 is significantly different than that in 1977.

*** Sample size is insufficient to permit a reliable estimate.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Science Course Taking at Ages 9, 13, and 17

Since 1986, NAEP has gathered information about the percentages of students studying certain science subjects. Nine-year-olds were asked how frequently they have science class in school. Results for the nation are shown in Table 2.3. In 1996, the majority of students reported having science class "Every day" (30 percent) or "Several times a week" (31 percent). About one-fourth of 9-year-olds responded "About once a week" (18 percent) or "Less than once a week" (6 percent). About 15 percent responded that they "Hardly ever or never" had science class in school. No difference was observed between the percentages in 1986 and those in 1996. In 1996, 9-year-olds who reported "Hardly ever or never" having science class had lower average science scores than their peers who reported having class about once a week or more frequently.

Table 2.3 — **Frequency of Science Classes at Age 9 for the Nation, 1986 and 1996**

THE NATION'S REPORT CARD naep

9-Year-Olds' Reports of Frequency of Science Class...	Year	Percent of Students	Average Scale Score
Hardly ever or never	1996	15 (0.9)	216 (1.6)
	1986	17 (1.3)	211 (2.5)
Less than once a week	1996	6 (0.4)	223 (4.7)
	1986	6 (0.5)	219 (3.4)
About once a week	1996	18 (0.8)	225 (2.1)
	1986	19 (1.1)	222 (2.1)
Several times a week	1996	31 (1.3)	237 (1.7)
	1986	31 (1.5)	232 (1.7)
Every day	1996	30 (1.6)	234 (2.0)
	1986	28 (2.0)	227 (2.1)

Standard errors of the estimated percentages and scale scores appear in parentheses.

* Indicates that the percentage or average scale score in 1996 is significantly different than that in 1986.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Thirteen-year-old students in 1996 were asked what they were mainly studying in their current science class. Results for the nation are shown in Table 2.4. Of the 97 percent who were studying science, about equal percentages reported studying life science (21 percent), physical science (22 percent), and earth science (19 percent). In 1996, 28 percent reported studying a mixture of these three (general science), which was an increase over the percentage reported in 1986. The only significant change between 1986 and 1996 in average science scores was an increase among students primarily studying life science. In 1996, 13-year-olds who reported that the content of their science class was mainly life, physical, earth, or general science had higher average science scores than their peers who reported "Other" as the content or who reported that they were not taking a science class.

Table 2.4 **Content of Science Classes at Age 13 for the Nation , 1986 and 1996**

THE NATION'S REPORT CARD

13-Year-Olds' Reports on the Content of Their Science Class...	Year	Percent of Students	Average Scale Score
Not taking science	1996	3 (0.8)	237 (4.9)
	1986	8 (1.8)	242 (4.5)
Life science	1996	21 (1.2)	253 (1.8) *
	1986	19 (2.4)	243 (2.3)
Physical science	1996	22 (1.9)	260 (1.8)
	1986	22 (2.9)	260 (2.8)
Earth science	1996	19 (1.8)	266 (2.1)
	1986	24 (3.5)	259 (2.3)
General science	1996	28 (1.7) *	259 (1.5)
	1986	20 (2.0)	255 (1.8)
Other	1996	7 (0.6)	242 (3.0)
	1986	6 (1.7)	245 (6.2)

Standard errors of the estimated percentages and scale scores appear in parentheses.

* Indicates that the percentage or average scale score in 1996 is significantly different than that in 1986.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Many school curricula follow the sequence of biology, chemistry, and physics. Therefore, most students have studied biology by the time they are 17 years old. Age 17 students were asked whether they were taking or had taken a course in general science, biology, chemistry, and physics. Tables 2.5 and 2.6 present the percentages of 17-year-old students taking these courses, and their average science scores. Results are given for the nation and by gender in Table 2.5, and for racial/ethnic groups in Table 2.6.

In 1996, nearly all 17-year-olds (94 percent) reported that they had taken or were currently taking biology, and 85 percent reported taking general science. Fifty-six percent reported taking chemistry, while relatively few students (14 percent) reported taking physics. For biology and chemistry, the national percentages were higher in 1996 than in 1986. For general science and physics, the 1986 and 1996 percentages were not significantly different. A direct comparison of average science scores in 1996 and 1986 showed that the average score in 1996 was higher than the previous decade for students who had taken general science and biology. Among 17-year-olds who had taken chemistry or physics, the 1996 average score was not significantly improved over the average in 1986.

Gender. Reflecting results for the nation, the percentages of male and female students taking biology and chemistry increased from 1986 to 1996. At the same time, the percentage of females taking physics increased, while no significant differences were observed for males or females in the percentages taking general science. In 1996, a higher percentage of 17-year-old females than males reported taking biology and chemistry, however, the percentage of males taking physics was higher than the percentage of females.

Comparisons of average scores in 1996 to those in 1986 showed improvement among females taking general science, biology, and physics. In contrast, no significant change was observed between 1986 and 1996 in the performance of males taking general science, biology, chemistry, or physics. Comparisons of average science scores between age 17 males and females in 1996 showed a number of significant differences between the two groups. Males taking general science, biology, and chemistry outperformed their female counterparts. No significant difference in performance was found between males and females taking physics, however.

Table 2.5 **Science Course Taking at Age 17, for the Nation and by Gender, 1986 and 1996**

THE NATION'S REPORT CARD

17-Year-Olds' Reports on Taking Science Courses in...	Year	TOTAL		MALE		FEMALE	
		Percent of Students	Average Scale Score	Percent of Students	Average Scale Score	Percent of Students	Average Scale Score
General science	1996	85 (1.6)	297 (1.2) *	85 (1.6)	301 (1.7)	84 (1.8)	293 (1.3) *
	1986	83 (1.3)	290 (1.3)	84 (1.5)	298 (1.7)	82 (1.6)	283 (1.6)
Biology	1996	94 (0.8) *	300 (1.3) *	92 (1.2) *	305 (1.8)	95 (0.7) *	295 (1.5) *
	1986	88 (1.0)	294 (1.5)	87 (1.1)	301 (1.8)	88 (1.1)	287 (1.7)
Chemistry	1996	56 (1.6) *	315 (1.9)	53 (2.2) *	322 (2.7)	58 (1.7) *	310 (2.1)
	1986	40 (1.6)	312 (2.1)	42 (1.8)	319 (2.7)	39 (2.1)	304 (2.2)
Physics	1996	14 (1.1)	309 (3.0)	16 (1.3)	311 (3.7)	12 (1.0) *	306 (4.0) *
	1986	11 (0.9)	296 (4.7)	14 (1.3)	305 (6.8)	8 (0.7)	282 (3.8)

Standard errors of the estimated percentages and scale scores appear in parentheses.

* Indicates that the percentage or average scale score in 1996 is significantly different than that in 1986.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Race/Ethnicity. Table 2.6 presents trends in science course taking by race/ethnicity. Nearly all White (95 percent) and Black (94 percent) 17-year-old students in 1996 reported taking biology. The corresponding figure for Hispanic students was 87 percent. The percentage of White students who had taken biology was higher in 1996 than in 1986. Among all three racial/ethnic groups, the percentage of students taking chemistry increased considerably from 1986 to 1996, while no significant percentage changes were observed for any racial/ethnic group in physics.

For White 17-year-olds, average science scores among students taking general science and biology increased between 1986 and 1996. The performance of Black students taking physics also improved during this time period, but no significant differences were observed among Hispanic students taking any science subject. (It should be noted that the sample size of Hispanic students taking physics was insufficient to reliably estimate scale scores.)

In 1996, a higher percentage of White students than Black students reported taking general science. A greater percentage of Black students than White students, however, reported taking physics. About 58 percent of White 17-year-olds reported taking chemistry, which was higher than the 46 percent of Hispanic students. In 1996, White students had higher average science scores than their Black and Hispanic peers at each level of science course work. In interpreting these findings, it should be considered that science courses covering the same topic may vary in content and instructional approach from school to school and from state to state.

Table 2.6

Science Course Taking at Age 17, by Race/Ethnicity, 1986 and 1996

THE NATION'S REPORT CARD naep

17-Year-Olds' Reports on Taking Science Courses in...	Year	WHITE		BLACK		HISPANIC	
		Percent of Students	Average Scale Score	Percent of Students	Average Scale Score	Percent of Students	Average Scale Score
General science	1996	86 (2.0)	306 (1.4) *	78 (1.9)	264 (2.5)	84 (2.8)	274 (2.9)
	1986	84 (1.6)	297 (1.5)	83 (2.6)	257 (2.8)	82 (3.5)	264 (4.5)
Biology	1996	95 (0.8) *	309 (1.3) *	94 (1.6)	266 (2.3)	87 (3.8)	276 (2.6)
	1986	89 (1.1)	301 (1.8)	84 (2.7)	260 (3.1)	84 (3.4)	265 (3.7)
Chemistry	1996	58 (1.9) *	323 (1.9)	49 (3.0) *	284 (3.8)	46 (3.6) *	293 (3.8)
	1986	43 (1.8)	317 (2.2)	29 (2.6)	275 (6.4)	24 (2.2)	281 (8.7)
Physics	1996	12 (1.3)	323 (4.4)	19 (1.6)	270 (8.3) *	16 (2.7)	*** (***)
	1986	10 (0.8)	316 (4.4)	18 (3.5)	239 (5.4)	13 (2.8)	*** (***)

Standard errors of the estimated percentages and scale scores appear in parentheses.

* Indicates that the percentage or average scale score in 1996 is significantly different than that in 1986.

*** Sample size is insufficient to permit a reliable estimate.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Attitudes about the Value of Science at Ages 13 and 17

Students aged 13 and 17 were asked whether they agreed or disagreed with three statements about the value of science (Table 2.7). To determine whether attitudes have changed over time, the percentages of students in 1996 who agreed with these statements about the value of science were compared to the corresponding percentages in 1977. In general, relatively few changes in attitude were observed across the years. The only significant change was an increase in the percentage of 17-year-olds who agreed that science should be required in school. Among 17-year-olds, higher scores were observed in 1996 than in 1977 among those who agreed with each statement about the value of science.

Table 2.7 **Attitudes About the Value of Science at Ages 13 and 17, 1977 and 1996**

			STRONGLY AGREE OR AGREE		UNDECIDED, DISAGREE, OR STRONGLY DISAGREE	
	Age	Year	Percent of Students	Average Scale Score	Percent of Students	Average Scale Score
Much of what you learn in science classes is useful in everyday life.	13	1996	56 (1.2)	256 (2.1)	44 (1.2)	255 (1.4)
		1977	58 (1.4)	249 (2.3)	43 (1.4)	256 (2.1)
	17	1996	55 (1.5)	299 (2.0) *	45 (1.5)	297 (2.5)
		1977	53 (1.2)	290 (2.4)	47 (1.2)	293 (1.8)
Much of what you learn in science classes will be useful in the future.	13	1996	71 (1.5)	257 (1.9)	29 (1.5)	250 (1.7)
		1977	75 (1.2)	251 (2.1)	26 (1.2)	255 (2.8)
	17	1996	68 (1.2)	301 (1.7) *	32 (1.2)	293 (2.9)
		1977	65 (1.3)	292 (2.0)	35 (1.3)	290 (2.0)
Science should be required in school.	13	1996	71 (1.6)	257 (1.9)	29 (1.6)	250 (2.1)
		1977	70 (1.2)	252 (2.1)	30 (1.2)	252 (2.5)
	17	1996	76 (1.1) *	302 (1.7) *	24 (1.1) *	288 (2.5)
		1977	62 (1.1)	292 (2.0)	38 (1.1)	291 (2.4)

Standard errors of the estimated percentages and scale scores appear in parentheses.

* Indicates that the percentage or average scale score in 1996 is significantly different than that in 1977.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Thirteen- and 17-year-old students were also asked to respond to questions about the application of science in helping to remedy real-life problems. Table 2.8 shows the 1977 and 1996 percentages of students responding "Very much" to these questions.

Increases were observed in the percentages of 13-year-olds who agreed "Very much" that science applications could help prevent energy shortages, find cures for diseases, control weather, prevent birth defects, save natural resources, and reduce pollution. A decrease between 1977 and 1996 was observed for the statement about preventing starvation. In fact, the percentage of 13-year-olds in 1996 who felt that science could help prevent world starvation (16 percent) was just half that observed in 1977 (32 percent).

Among 17-year-olds, there were increases in the percentages of students who responded "Very much" to statements about the applications of science in preventing energy shortages, preventing birth defects, saving natural resources, and reducing pollution. A smaller percentage of students in 1996 than in 1977 agreed that science applications could help prevent world starvation and reduce overpopulation. As was observed at age 13, the percentage of 17-year-olds who expressed a belief that science could help prevent starvation dropped by about half (from 51 to 24 percent) between 1977 and 1996.

Table 2.8

Perceived Applications of Science at Ages 13 and 17, 1977 and 1996

THE NATION'S REPORT CARD

How much do you think that the application of science can help...		PERCENTAGE OF STUDENTS RESPONDING "VERY MUCH"	
		AGE 13	AGE 17
Prevent world starvation?	1996	16 (0.9) *	24 (1.1) *
	1977	32 (1.5)	51 (1.2)
Save us from an energy shortage?	1996	67 (1.4) *	74 (1.2) *
	1977	54 (1.7)	70 (1.0)
Find cures for diseases?	1996	75 (1.2) *	87 (0.9)
	1977	70 (1.5)	85 (0.8)
Control weather?	1996	21 (1.0) *	18 (1.6)
	1977	15 (0.9)	16 (0.8)
Prevent birth defects?	1996	39 (1.4) *	53 (1.3) *
	1977	23 (1.2)	44 (1.2)
Save our natural resources?	1996	59 (1.7) *	59 (1.3) *
	1977	47 (1.1)	48 (1.2)
Reduce air and water pollution?	1996	56 (1.0) *	60 (1.2) *
	1977	44 (1.2)	54 (1.2)
Reduce overpopulation?	1996	13 (1.1)	14 (0.8) *
	1977	11 (0.8)	22 (0.8)

Standard errors of the estimated percentages appear in parentheses.

* Indicates that the percentage in 1996 is significantly different than that in 1977.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Summary

- No significant differences were observed between 1977 and 1996 in the percentage of 9-year-olds who reported having experimented with living plants, batteries and bulbs, shadows, and dissolving things in water. A smaller percentage of students in 1996 than in 1977 reported having experimented with living animals. In 1996, students who had experience working with living plants and dissolving things in water had higher average science scores than students without these experiences.
- A higher percentage of 9-year-old students in 1996 than in 1977 had used scientific equipment. The only exception was use of a microscope and a scale to weigh things, which did not change significantly between 1977 and 1996. For all types of equipment, students who had used each instrument had higher average science scores than students who had not.
- No significant differences between 1986 and 1996 were observed in the percentages of 9-year-olds' reports on frequency of science class. In 1996, the majority of students reported having science class at least several times a week. Only 15 percent of 9-year-olds reported never or hardly ever having science class.
- Among 13-year-olds, an increase between 1986 and 1996 was observed in the percentage of students taking general science. No significant differences were found in the percentages taking life science, physical science, or earth science. Higher average science scores in 1996 than in 1986 were found for 13-year-old students studying life science.
- Between 1986 and 1996, increases were observed in the percentages of 17-year-old students who had taken biology and chemistry. At the same time, no significant differences were found in the percentages taking general science or physics. Between 1986 and 1996, average score increases were found for 17-year-old students who had taken general science and biology, but no significant differences were observed among those taking chemistry or physics.
- In 1996, the percentage of age 17 male and female students taking biology and chemistry had increased since 1986, as had the percentage of females taking physics. No significant percentage increases were observed in general science course taking for either group. In 1996, a higher percentage of female than male students reported taking biology and chemistry. The percentage of male students taking physics was higher than for females.
- Between 1986 and 1996, average score increases were observed for female students taking general science, biology, and physics. No significant increases in performance were found for male students.
- Among White 17-year-olds, a greater percentage reported taking biology in 1996 than in 1986. The percentage of Black and Hispanic students taking biology did not change significantly during this time period. For all three racial groups, a higher percentage of students in 1996 than in 1986 reported taking chemistry. No significant changes were observed for physics, however. For White students, average science scores among students taking biology and general science increased between 1986 and 1996. The performance of

Black students taking physics also rose over this time period. No significant score improvements at any level of course work were observed for Hispanic students. White students had higher average science scores than their Black and Hispanic peers at each level of course work.

- No significant differences between 1977 and 1996 were observed in 13-year-olds' attitudes about the value of science. The percentage of 17-year-olds who agreed that science should be required in school increased between 1977 and 1996. For this same age group, the average science score increased for those who agreed that science classes are useful in everyday life, that science will be useful in the future, and that science should be required in school.
- The percentages of 13- and 17-year-olds who believed that science can help solve societal problems were generally higher in 1996 than in 1977, although there were some exceptions. Most notably, 13- and 17-year-olds in 1996 were less likely than those in the earlier assessment to believe that science can help prevent starvation, and 17-year-old students were less likely to believe that science can reduce overpopulation. No significant differences between 1977 and 1996 were observed in the percentage of 13-year-olds who believed that science can help reduce overpopulation, or in the percentages of 17-year-olds who agreed that science applications can help find cures for diseases and control weather.

Data Appendix A

Science

Table A.1

NAEP 1996 Science Long-Term Trend Assessment — Age 9
Percentages of students with science scale scores at or above 150

THE NATION'S REPORT CARD naep

	1977	1982	1986	1990	1992	1994	1996	*	‡	L	Q
TOTAL	93.5 (0.6)	95.2 (0.7)	96.2 (0.3)	97.0 (0.3)	97.4 (0.3)	97.2 (0.4)	96.8 (0.4)	+		+	–
Gender											
Male	94.3 (0.5)	95.0 (1.0)	96.8 (0.5)	96.8 (0.5)	97.7 (0.3)	97.1 (0.4)	96.9 (0.5)	+		+	
Female	92.8 (0.7)	95.5 (1.2)	95.6 (0.6)	97.1 (0.4)	97.1 (0.5)	97.3 (0.5)	96.6 (0.6)	+		+	–
Race/Ethnicity											
White	97.7 (0.3)	98.3 (0.4)	98.2 (0.3)	99.2 (0.2)	99.2 (0.1)	99.1 (0.3)	98.6 (0.3)			+	
Black	72.4 (1.8)	82.1 (3.0)	88.6 (1.4)	88.0 (1.3)	90.7 (1.8)	91.0 (1.5)	91.0 (1.6)	+		+	–
Hispanic	84.6 (1.8)	85.1 (3.1)	89.6 (2.4)	93.6 (1.5)	92.4 (1.7)	91.1 (2.3)	92.6 (1.9)	+		+	
Other	94.9 (2.4)	*****(****)	95.9 (1.8)	96.3 (****)	96.3 (1.8)	93.9 (1.7)	94.6 (2.0)				
Grade											
Below Modal Grade	86.2 (1.1)	88.5 (1.9)	91.8 (0.8)	93.2 (0.9)	94.5 (0.7)	94.3 (0.9)	94.0 (0.8)	+		+	
At Modal Grade	95.9 (0.6)	98.1 (0.6)	98.5 (0.3)	99.0 (0.3)	99.2 (0.2)	98.6 (0.3)	98.2 (0.3)	+		+	–
Above Modal Grade	96.4 (2.2)	*****(****)	*****(****)	*****(****)	*****(****)	*****(****)	*****(****)				
Region											
Northeast	94.6 (0.7)	94.5 (1.4)	96.7 (0.9)	97.1 (0.6)	97.9 (0.9)	97.9 (0.5)	97.3 (0.6)	+		+	
Southeast	87.8 (1.8)	92.7 (1.6)	95.0 (1.2)	94.6 (0.9)	95.6 (0.5)	96.5 (0.8)	95.8 (1.0)	+		+	
Central	95.5 (0.8)	97.5 (1.1)	97.1 (0.6)	98.4 (0.7)	98.7 (0.5)	98.0 (0.7)	97.2 (0.8)				
West	94.9 (1.1)	95.4 (1.3)	95.9 (0.7)	97.7 (0.7)	97.3 (0.5)	96.3 (0.8)	96.8 (0.8)				
Parents' Education Level											
Less than H.S.	86.0 (1.7)	85.5 (3.5)	90.1 (3.4)	93.3 (2.3)	96.0 (1.5)	93.2 (1.9)	91.8 (1.8)			+	
Graduated H.S.	95.0 (0.5)	96.1 (1.0)	95.6 (0.6)	96.9 (0.8)	95.2 (0.7)	96.6 (0.8)	96.4 (1.1)				
Some Education After H.S.	97.1 (0.9)	96.6 (1.8)	98.0 (1.1)	97.6 (1.2)	97.6 (1.0)	97.8 (1.0)	98.5 (0.4)				
Graduated College	96.8 (0.6)	97.2 (0.7)	98.0 (0.4)	98.1 (0.4)	98.5 (0.5)	98.2 (0.3)	98.3 (0.3)			+	
Unknown	91.4 (0.8)	93.8 (1.9)	95.0 (0.6)	96.0 (0.6)	97.1 (0.5)	96.3 (0.8)	95.2 (0.8)	+		+	
Type Of School											
Public	93.0 (0.7)	94.9 (0.8)	95.8 (0.4)	96.7 (0.4)	97.1 (0.4)	96.9 (0.4)	96.7 (0.5)	+		+	–
Nonpublic	98.1 (0.6)	98.9 (****)	98.2 (0.7)	98.7 (****)	99.2 (****)	99.3 (0.4)	97.2 (1.2)				
Quartiles											
Upper	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)				
Middle two	99.5 (0.1)	100.0 (****)	99.8 (0.1)	100.0 (****)	100.0 (****)	100.0 (****)	99.9 (****)				
Lower	75.2 (1.4)	81.0 (2.5)	85.2 (1.1)	87.9 (1.2)	89.6 (1.3)	88.9 (1.3)	88.2 (1.4)	+		+	–

Standard errors of the estimated percentages appear in parentheses. When no value appears (****), statistical tests involving this value should be interpreted with caution; standard error estimates may not be accurately determined and/or the sampling distribution of the statistic does not match statistical test assumptions (See Procedural Appendix).

* Indicates that the percentage in 1996 is significantly larger (+) or smaller (–) than that in 1977.

‡ Indicates that the percentage in 1996 is significantly larger (+) or smaller (–) than that in 1994.

L Indicates that the positive (+) or negative (–) linear trend is significant.

Q Indicates that the positive (+) or negative (–) quadratic trend is significant.

***** Data are unavailable for this assessment year.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Table A.2

NAEP 1996 Science Long-Term Trend Assessment — Age 9
Percentages of students with science scale scores at or above 200

THE NATION'S REPORT CARD naep

	1977	1982	1986	1990	1992	1994	1996	*	‡	L	Q
TOTAL	68.0 (1.1)	70.7 (1.9)	72.0 (1.1)	76.4 (0.9)	78.0 (1.2)	77.4 (1.0)	76.1 (1.2)	-		-	
Gender											
Male	69.5 (1.2)	69.7 (2.0)	74.1 (1.4)	76.3 (1.2)	80.4 (1.4)	77.6 (0.9)	76.8 (1.8)	+		+	
Female	66.5 (1.1)	71.8 (2.2)	70.0 (1.3)	76.4 (1.1)	75.7 (1.2)	77.2 (1.4)	75.5 (1.0)	+		+	
Race/Ethnicity											
White	76.8 (0.7)	78.4 (2.0)	78.9 (1.0)	84.4 (0.7)	85.5 (0.9)	85.6 (1.0)	83.8 (1.2)	+		+	
Black	27.2 (1.5)	38.9 (2.7)	46.2 (2.3)	46.4 (3.1)	51.3 (3.5)	51.6 (2.3)	52.2 (3.4)	+		+	
Hispanic	42.0 (3.1)	40.2 (6.1)	50.1 (3.7)	56.3 (3.7)	55.5 (4.3)	49.9 (3.1)	57.8 (3.1)	+		+	
Other	62.0 (6.9)	*****(****)	67.4 (4.1)	76.3 (7.0)	73.2 (3.7)	65.3 (5.6)	70.1 (4.9)				
Grade											
Below Modal Grade	48.8 (1.8)	50.1 (3.3)	55.1 (1.7)	61.1 (2.1)	64.5 (1.6)	64.4 (1.4)	63.7 (2.3)	+		+	
At Modal Grade	74.2 (1.1)	79.6 (1.9)	80.7 (0.9)	84.5 (1.0)	86.1 (1.3)	83.8 (1.3)	82.3 (1.0)	+		+	-
Above Modal Grade	83.0 (4.1)	*****(****)	*****(****)	*****(****)	*****(****)	*****(****)	*****(****)				
Region											
Northeast	72.6 (1.6)	71.5 (3.5)	75.6 (2.5)	78.2 (2.3)	80.6 (2.2)	80.0 (2.7)	79.1 (1.8)	+		+	
Southeast	55.0 (2.4)	63.0 (3.6)	67.3 (3.0)	68.4 (2.4)	71.4 (2.4)	74.5 (2.7)	71.6 (3.1)	+		+	
Central	72.5 (2.1)	75.4 (3.7)	75.2 (2.1)	81.9 (1.3)	83.7 (1.4)	81.9 (2.2)	79.1 (2.2)			+	
West	68.5 (2.3)	71.4 (3.8)	69.9 (3.0)	76.8 (2.1)	75.9 (2.7)	73.6 (2.1)	74.9 (1.6)				
Parents' Education Level											
Less than H.S.	49.8 (2.4)	54.9 (8.7)	55.1 (3.6)	60.5 (4.2)	68.5 (3.2)	61.8 (4.0)	59.8 (3.4)				
Graduated H.S.	71.2 (1.4)	68.2 (4.3)	69.1 (1.9)	75.2 (2.1)	71.2 (2.0)	73.7 (1.9)	71.6 (2.6)				
Some Education After H.S.	81.9 (1.5)	80.7 (2.4)	80.2 (1.9)	81.3 (2.3)	82.1 (1.9)	82.8 (2.5)	84.9 (1.9)				
Graduated College	77.7 (1.2)	78.8 (2.0)	80.4 (1.2)	81.9 (1.2)	84.3 (1.3)	83.1 (1.3)	83.3 (1.6)	+		+	
Unknown	60.8 (1.5)	60.9 (3.6)	65.0 (2.0)	71.3 (1.4)	73.2 (1.8)	71.6 (2.0)	68.8 (1.2)	+		+	
Type Of School											
Public	66.4 (1.3)	69.5 (2.1)	70.5 (1.3)	75.5 (1.0)	76.7 (1.3)	76.1 (1.2)	75.3 (1.3)	+		+	
Nonpublic	80.3 (1.7)	82.6 (3.5)	79.7 (2.3)	83.6 (2.4)	86.2 (2.0)	87.1 (2.4)	81.6 (3.2)				
Quartiles											
Upper	99.0 (0.3)	100.0 (****)	99.7 (0.2)	99.9 (****)	99.9 (****)	99.9 (****)	99.9 (****)	-			
Middle two	78.4 (0.6)	85.6 (1.9)	84.9 (1.1)	90.0 (0.8)	91.3 (1.0)	91.3 (0.9)	91.1 (1.2)	+		+	
Lower	16.2 (1.1)	11.6 (2.0)	18.6 (1.6)	25.6 (2.0)	29.2 (2.3)	27.3 (2.1)	27.5 (2.0)	+		+	

Standard errors of the estimated percentages appear in parentheses. When no value appears (****), statistical tests involving this value should be interpreted with caution; standard error estimates may not be accurately determined and/or the sampling distribution of the statistic does not match statistical test assumptions (See Procedural Appendix).

* Indicates that the percentage in 1996 is significantly larger (+) or smaller (–) than that in 1977.

‡ Indicates that the percentage in 1996 is significantly larger (+) or smaller (–) than that in 1994.

L Indicates that the positive (+) or negative (–) linear trend is significant.

Q Indicates that the positive (+) or negative (–) quadratic trend is significant.

***** Data are unavailable for this assessment year.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Table A.3

NAEP 1996 Science Long-Term Trend Assessment — Age 9
Percentages of students with science scale scores at or above 250

THE NATION'S REPORT CARD naep

	1977	1982	1986	1990	1992	1994	1996	*	‡	L	Q
TOTAL	25.7 (0.7)	24.3 (1.8)	27.5 (1.4)	31.1 (0.8)	32.8 (1.0)	33.7 (1.2)	32.2 (1.3)	+		+	
Gender											
Male	27.4 (0.9)	25.6 (2.6)	29.9 (2.0)	33.1 (1.1)	37.2 (1.7)	35.3 (1.4)	33.9 (1.9)	+		+	
Female	24.0 (0.9)	23.0 (2.0)	25.1 (1.4)	29.1 (1.0)	28.6 (1.1)	32.2 (1.5)	30.7 (1.9)	+		+	
Race/Ethnicity											
White	30.8 (0.7)	29.4 (2.1)	32.7 (1.5)	37.5 (1.1)	39.4 (1.1)	40.8 (1.5)	39.6 (1.5)	+		+	
Black	3.5 (0.6)	3.9 (1.3)	8.3 (1.5)	8.5 (1.1)	9.2 (1.4)	11.1 (1.4)	10.6 (2.0)	+		+	
Hispanic	8.8 (1.7)	4.2 (2.7)	10.7 (2.4)	11.6 (2.1)	11.7 (1.8)	10.8 (2.5)	13.1 (3.1)				
Other	20.5 (4.9)	*****(****)	27.1 (5.8)	30.1 (6.0)	30.4 (4.7)	22.1 (4.3)	25.8 (4.9)				
Grade											
Below Modal Grade	11.0 (0.9)	8.4 (1.7)	13.0 (1.3)	16.5 (1.2)	20.0 (1.6)	20.3 (1.6)	18.1 (1.0)	+		+	
At Modal Grade	30.3 (0.9)	31.0 (2.5)	35.0 (1.7)	39.0 (1.1)	40.4 (1.0)	40.5 (1.6)	39.4 (1.9)	+		+	
Above Modal Grade	45.7 (7.0)	*****(****)	*****(****)	*****(****)	*****(****)	*****(****)	*****(****)				
Region											
Northeast	28.9 (1.1)	25.8 (3.1)	30.5 (2.9)	33.4 (2.9)	35.9 (2.7)	36.8 (2.3)	35.0 (2.6)			+	
Southeast	17.2 (1.5)	20.2 (3.6)	23.3 (3.0)	24.9 (1.4)	26.5 (1.8)	30.4 (2.3)	27.9 (3.0)	+		+	
Central	29.2 (1.6)	27.5 (3.6)	30.1 (2.3)	34.4 (1.8)	38.7 (2.3)	38.1 (2.6)	35.9 (2.7)			+	
West	25.3 (1.2)	23.1 (4.6)	26.2 (2.6)	31.7 (1.7)	29.8 (2.2)	30.1 (2.7)	30.7 (2.6)				
Parents' Education Level											
Less than H.S.	12.7 (1.3)	8.6 (4.0)	12.7 (2.7)	16.3 (3.5)	19.6 (2.8)	16.2 (3.1)	16.1 (3.7)				
Graduated H.S.	27.0 (1.2)	20.3 (3.1)	23.1 (1.8)	27.3 (1.8)	26.2 (1.7)	27.4 (2.3)	24.7 (2.1)				
Some Education After H.S.	39.4 (1.5)	31.9 (5.1)	38.5 (3.7)	40.7 (2.5)	39.2 (3.1)	42.1 (4.3)	44.1 (4.1)				
Graduated College	35.1 (1.2)	32.2 (2.7)	36.8 (1.8)	38.3 (1.2)	40.2 (1.4)	40.6 (1.6)	41.7 (2.0)	+		+	
Unknown	18.9 (0.8)	16.1 (2.1)	19.5 (1.7)	23.9 (1.3)	26.5 (1.7)	26.8 (1.9)	22.7 (2.0)			+	
Type Of School											
Public	24.5 (0.9)	23.9 (2.1)	26.3 (1.5)	30.3 (0.8)	31.5 (1.0)	32.5 (1.4)	30.9 (1.4)	+		+	
Nonpublic	35.6 (1.9)	28.2 (5.6)	33.8 (2.8)	37.2 (3.0)	40.6 (3.4)	42.7 (2.8)	41.1 (3.7)			+	
Quartiles											
Upper	70.1 (1.1)	79.1 (3.0)	76.1 (2.0)	80.2 (1.5)	82.7 (1.6)	82.4 (1.4)	83.1 (1.8)	+		+	
Middle two	16.2 (0.6)	9.1 (1.9)	16.9 (1.5)	22.1 (1.0)	23.9 (1.3)	24.4 (1.6)	22.9 (1.7)	+		+	
Lower	0.2 (0.1)	0.0 (****)	0.2 (****)	0.2 (0.1)	0.4 (0.2)	0.4 (0.2)	0.4 (****)				

Standard errors of the estimated percentages appear in parentheses. When no value appears (****), statistical tests involving this value should be interpreted with caution; standard error estimates may not be accurately determined and/or the sampling distribution of the statistic does not match statistical test assumptions (See Procedural Appendix).

* Indicates that the percentage in 1996 is significantly larger (+) or smaller (–) than that in 1977.

‡ Indicates that the percentage in 1996 is significantly larger (+) or smaller (–) than that in 1994.

L Indicates that the positive (+) or negative (–) linear trend is significant.

Q Indicates that the positive (+) or negative (–) quadratic trend is significant.

***** Data are unavailable for this assessment year.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Table A.4

NAEP 1996 Science Long-Term Trend Assessment — Age 9
Percentages of students with science scale scores at or above 300

THE NATION'S REPORT CARD naep

	1977	1982	1986	1990	1992	1994	1996	*	‡	L	Q
TOTAL	3.2 (0.3)	2.3 (0.7)	3.0 (0.5)	3.1 (0.3)	3.4 (0.3)	3.8 (0.4)	4.4 (0.4)	+		+	+
Gender											
Male	3.7 (0.3)	2.5 (1.0)	3.8 (0.6)	4.2 (0.6)	4.6 (0.6)	4.5 (0.7)	5.2 (0.7)			+	
Female	2.6 (0.3)	2.1 (0.6)	2.2 (0.5)	2.0 (0.3)	2.2 (0.3)	3.2 (0.4)	3.6 (0.6)				+
Race/Ethnicity											
White	3.9 (0.3)	2.9 (0.9)	3.8 (0.6)	3.9 (0.4)	4.3 (0.4)	4.9 (0.6)	5.9 (0.5)	+		+	+
Black	0.2 (****)	0.1 (****)	0.3 (****)	0.1 (****)	0.3 (****)	0.2 (****)	0.3 (****)				
Hispanic	0.3 (****)	0.0 (****)	0.2 (****)	0.4 (****)	0.4 (****)	0.7 (0.5)	0.4 (****)				
Other	1.9 (1.0)	*****(****)	2.1 (1.1)	3.2 (1.5)	3.2 (1.5)	1.4 (****)	1.6 (0.8)				
Grade											
Below Modal Grade	0.7 (0.1)	0.1 (****)	0.6 (0.2)	0.9 (0.4)	1.2 (0.3)	1.4 (0.5)	1.4 (0.4)				
At Modal Grade	3.9 (0.4)	3.0 (0.9)	4.2 (0.7)	4.3 (0.5)	4.7 (0.4)	5.0 (0.6)	5.9 (0.7)	+		+	
Above Modal Grade	9.7 (5.1)	*****(****)	*****(****)	*****(****)	*****(****)	*****(****)	*****(****)				
Region											
Northeast	3.6 (0.4)	2.6 (1.2)	3.7 (1.9)	3.4 (0.7)	4.1 (0.8)	4.5 (1.0)	5.6 (1.2)				
Southeast	1.6 (0.3)	1.4 (0.5)	2.3 (0.4)	2.2 (0.7)	2.5 (0.7)	3.1 (1.2)	3.2 (0.8)				
Central	3.8 (0.5)	2.9 (1.5)	3.2 (0.8)	3.8 (0.8)	4.4 (0.6)	4.3 (0.9)	5.0 (0.8)				
West	3.2 (0.5)	2.1 (****)	2.7 (0.9)	3.0 (0.5)	2.6 (0.5)	3.4 (0.5)	3.9 (0.8)				
Parents' Education Level											
Less than H.S.	0.9 (0.4)	0.2 (****)	0.8 (****)	0.5 (****)	1.7 (1.0)	0.6 (****)	0.4 (****)				
Graduated H.S.	3.2 (0.3)	1.8 (****)	1.6 (0.5)	2.0 (0.6)	1.8 (0.6)	2.5 (0.7)	1.8 (0.8)				
Some Education After H.S.	5.7 (1.0)	2.4 (****)	4.4 (1.4)	5.4 (1.3)	4.8 (1.5)	6.2 (1.5)	7.0 (2.5)				
Graduated College	5.4 (0.7)	3.7 (1.1)	5.0 (1.0)	4.5 (0.6)	5.0 (0.6)	5.1 (0.7)	7.0 (0.7)				
Unknown	1.7 (0.4)	0.8 (0.5)	1.4 (0.4)	1.6 (0.5)	1.9 (0.4)	2.4 (0.5)	1.9 (0.4)				
Type Of School											
Public	2.9 (0.3)	2.3 (0.7)	2.8 (0.6)	3.0 (0.4)	3.2 (0.3)	3.6 (0.5)	4.1 (0.3)	+		+	
Nonpublic	5.1 (1.1)	2.1 (1.2)	4.0 (0.7)	3.9 (1.0)	4.6 (1.3)	5.6 (1.0)	6.5 (2.2)				
Quartiles											
Upper	12.0 (0.9)	9.1 (2.3)	11.7 (1.7)	12.1 (1.3)	13.2 (1.1)	13.9 (1.6)	16.7 (1.3)	+		+	+
Middle two	0.3 (0.1)	0.0 (****)	0.1 (0.1)	0.2 (****)	0.2 (0.1)	0.2 (0.1)	0.2 (0.1)				
Lower	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)				

Standard errors of the estimated percentages appear in parentheses. When no value appears (****), statistical tests involving this value should be interpreted with caution; standard error estimates may not be accurately determined and/or the sampling distribution of the statistic does not match statistical test assumptions (See Procedural Appendix).

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‡ Indicates that the percentage in 1996 is significantly larger (+) or smaller (–) than that in 1994.

L Indicates that the positive (+) or negative (–) linear trend is significant.

Q Indicates that the positive (+) or negative (–) quadratic trend is significant.

***** Data are unavailable for this assessment year.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Table A.5

NAEP 1996 Science Long-Term Trend Assessment — Age 9
Percentages of students with science scale scores at or above 350

THE NATION'S REPORT CARD

	1977	1982	1986	1990	1992	1994	1996	*	‡	L	Q
TOTAL	0.1 (0.0)	0.0 (****)	0.1 (****)	0.1 (0.0)	0.1 (****)	0.1 (0.0)	0.1 (0.1)				
Gender											
Male	0.1 (0.0)	0.1 (****)	0.1 (****)	0.1 (0.1)	0.1 (0.1)	0.1 (0.1)	0.2 (0.1)				
Female	0.1 (0.0)	0.0 (****)	0.1 (****)	0.0 (****)	0.0 (****)	0.0 (****)	0.1 (****)				
Race/Ethnicity											
White	0.1 (0.0)	0.1 (****)	0.1 (****)	0.1 (0.1)	0.1 (****)	0.1 (0.1)	0.2 (0.1)				
Black	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)				
Hispanic	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)				
Other	0.0 (****)	*****(****)	0.1 (****)	0.1 (****)	0.0 (****)	0.0 (****)	0.0 (****)				
Grade											
Below Modal Grade	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)				
At Modal Grade	0.1 (0.0)	0.1 (****)	0.2 (****)	0.1 (0.1)	0.1 (****)	0.1 (0.1)	0.2 (0.1)				
Above Modal Grade	0.9 (****)	*****(****)	*****(****)	*****(****)	*****(****)	*****(****)	*****(****)				
Region											
Northeast	0.1 (0.1)	0.0 (****)	0.2 (****)	0.0 (****)	0.1 (****)	0.1 (****)	0.2 (****)				
Southeast	0.0 (****)	0.0 (****)	0.1 (****)	0.1 (****)	0.0 (0.0)	0.1 (****)	0.1 (****)				
Central	0.1 (****)	0.0 (****)	0.1 (****)	0.1 (****)	0.2 (****)	0.1 (0.1)	0.1 (****)				
West	0.0 (****)	0.1 (****)	0.1 (****)	0.1 (****)	0.0 (****)	0.1 (****)	0.1 (0.1)				
Parents' Education Level											
Less than H.S.	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)	0.1 (****)	0.0 (****)	0.0 (****)				
Graduated H.S.	0.1 (****)	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)	0.1 (****)	0.0 (****)				
Some Education After H.S.	0.1 (****)	0.0 (****)	0.1 (****)	0.1 (****)	0.1 (****)	0.1 (****)	0.2 (****)				
Graduated College	0.1 (0.1)	0.1 (****)	0.2 (****)	0.1 (0.1)	0.1 (0.1)	0.1 (****)	0.2 (0.1)				
Unknown	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)	0.1 (****)	0.0 (****)				
Type Of School											
Public	0.0 (0.0)	0.1 (****)	0.1 (****)	0.1 (0.0)	0.1 (0.0)	0.1 (0.1)	0.1 (0.1)				
Nonpublic	0.2 (****)	0.0 (****)	0.2 (****)	0.1 (****)	0.1 (****)	0.1 (****)	0.3 (****)				
Quartiles											
Upper	0.2 (0.1)	0.2 (****)	0.4 (****)	0.2 (0.1)	0.3 (****)	0.3 (0.2)	0.5 (0.3)				
Middle two	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)				
Lower	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)				

Standard errors of the estimated percentages appear in parentheses. When no value appears (****), statistical tests involving this value should be interpreted with caution; standard error estimates may not be accurately determined and/or the sampling distribution of the statistic does not match statistical test assumptions (See Procedural Appendix).

* Indicates that the percentage in 1996 is significantly larger (+) or smaller (–) than that in 1977.

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L Indicates that the positive (+) or negative (–) linear trend is significant.

Q Indicates that the positive (+) or negative (–) quadratic trend is significant.

***** Data are unavailable for this assessment year.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Table A.6

NAEP 1996 Science Long-Term Trend Assessment — Age 13
Percentages of students with science scale scores at or above 150

THE NATION'S REPORT CARD

	1977	1982	1986	1990	1992	1994	1996	*	‡	L	Q
TOTAL	98.5 (0.2)	99.5 (0.1)	99.7 (0.1)	99.7 (0.1)	99.6 (0.1)	99.7 (0.1)	99.7 (0.1)	+		+	-
Gender											
Male	98.8 (0.2)	99.7 (0.1)	99.8 (0.1)	99.7 (0.1)	99.6 (0.2)	99.7 (0.1)	99.7 (****)				
Female	98.2 (0.2)	99.2 (0.2)	99.7 (0.1)	99.7 (0.2)	99.6 (0.2)	99.7 (0.2)	99.6 (0.2)	+		+	-
Race/Ethnicity											
White	99.6 (0.1)	99.9 (0.0)	99.9 (****)	100.0 (****)	100.0 (****)	100.0 (****)	99.9 (****)				
Black	93.1 (1.0)	97.5 (0.7)	99.0 (0.4)	98.8 (0.6)	97.8 (0.6)	98.8 (0.6)	98.7 (0.8)	+		+	-
Hispanic	94.3 (1.3)	98.0 (0.8)	99.0 (0.6)	98.9 (0.6)	99.5 (****)	99.2 (0.4)	99.2 (0.4)	+			
Other	98.0 (1.1)	99.8 (****)	100.0 (****)	99.5 (****)	99.7 (****)	99.3 (****)	99.7 (****)				
Grade											
Below Modal Grade	96.0 (0.5)	98.4 (0.4)	99.3 (0.3)	99.3 (0.2)	99.1 (0.3)	99.3 (0.3)	99.3 (0.4)	+		+	-
At Modal Grade	99.4 (0.1)	99.9 (0.1)	99.9 (0.0)	99.9 (0.0)	99.9 (****)	99.9 (0.0)	99.9 (0.1)	+			
Above Modal Grade	100.0 (****)	***** (****)	***** (****)	***** (****)	***** (****)	***** (****)	***** (****)				
Region											
Northeast	99.3 (0.2)	99.5 (0.2)	99.8 (0.1)	99.7 (****)	99.4 (0.3)	100.0 (****)	99.6 (0.2)				
Southeast	97.3 (0.4)	98.9 (0.4)	99.5 (0.3)	99.6 (0.2)	99.4 (0.3)	99.6 (****)	99.6 (0.2)	+			
Central	99.1 (0.2)	99.8 (0.1)	99.8 (****)	99.9 (****)	99.8 (0.1)	99.7 (****)	99.8 (****)				
West	98.1 (0.3)	99.5 (0.2)	99.8 (0.1)	99.6 (0.2)	99.7 (****)	99.5 (****)	99.7 (****)				
Parents' Education Level											
Less than H.S.	96.4 (0.6)	97.9 (0.9)	98.6 (1.0)	99.5 (****)	98.5 (1.1)	99.3 (****)	98.8 (0.8)				
Graduated H.S.	99.0 (0.2)	99.6 (0.3)	99.8 (0.1)	99.7 (0.2)	99.3 (0.3)	99.6 (0.2)	99.6 (0.3)				
Some Education After H.S.	99.6 (0.2)	99.8 (****)	99.9 (****)	99.9 (****)	100.0 (****)	99.9 (****)	99.8 (****)				
Graduated College	99.7 (0.1)	99.9 (****)	99.9 (****)	99.9 (****)	99.9 (0.1)	99.9 (****)	99.9 (0.1)				
Unknown	95.5 (0.7)	98.6 (0.6)	98.9 (0.5)	98.4 (0.7)	98.7 (0.6)	98.7 (****)	99.1 (****)				
Type Of School											
Public	98.4 (0.2)	99.4 (0.1)	99.7 (0.1)	99.7 (0.1)	99.5 (0.1)	99.7 (0.1)	99.6 (0.2)	+		+	-
Nonpublic	99.8 (****)	99.8 (****)	100.0 (****)	100.0 (****)	99.9 (****)	100.0 (****)	99.9 (****)				
Quartiles											
Upper	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)				
Middle two	100.0 (0.0)	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)				
Lower	94.1 (0.6)	97.9 (0.5)	98.8 (0.4)	98.8 (0.3)	98.3 (0.5)	98.9 (0.4)	98.9 (0.4)	+		+	-

Standard errors of the estimated percentages appear in parentheses. When no value appears (****), statistical tests involving this value should be interpreted with caution; standard error estimates may not be accurately determined and/or the sampling distribution of the statistic does not match statistical test assumptions (See Procedural Appendix).

* Indicates that the percentage in 1996 is significantly larger (+) or smaller (–) than that in 1977.

‡ Indicates that the percentage in 1996 is significantly larger (+) or smaller (–) than that in 1994.

L Indicates that the positive (+) or negative (–) linear trend is significant.

Q Indicates that the positive (+) or negative (–) quadratic trend is significant.

***** Data are unavailable for this assessment year.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Table A.7

NAEP 1996 Science Long-Term Trend Assessment — Age 13
Percentages of students with science scale scores at or above 200

THE NATION'S REPORT CARD

	1977	1982	1986	1990	1992	1994	1996	*	‡	L	Q
TOTAL	86.0 (0.7)	89.8 (0.8)	91.6 (1.0)	92.3 (0.7)	93.1 (0.5)	92.4 (0.6)	92.0 (0.8)	+		+	–
Gender											
Male	87.2 (0.8)	91.9 (0.8)	92.9 (1.0)	92.7 (0.8)	93.1 (0.8)	92.2 (0.8)	93.2 (0.9)	+		+	–
Female	84.7 (0.8)	87.9 (1.0)	90.3 (1.2)	92.0 (0.8)	93.1 (0.7)	92.6 (0.6)	90.9 (1.2)	+		+	–
Race/Ethnicity											
White	92.2 (0.5)	94.4 (0.6)	96.1 (0.8)	96.9 (0.4)	97.9 (0.4)	97.6 (0.4)	97.0 (0.5)	+		+	–
Black	57.3 (2.4)	68.6 (2.4)	73.6 (3.0)	77.6 (3.6)	73.8 (2.8)	73.5 (3.2)	75.9 (2.7)	+		+	–
Hispanic	62.2 (2.4)	75.5 (3.3)	76.7 (3.2)	80.2 (2.9)	86.2 (2.6)	81.2 (2.5)	81.0 (2.8)	+		+	–
Other	80.9 (2.9)	94.2 (2.4)	93.6 (3.8)	88.1 (4.9)	94.5 (1.9)	92.6 (1.9)	90.1 (1.6)	+			
Grade											
Below Modal Grade	71.4 (1.6)	78.0 (1.8)	83.1 (1.9)	84.9 (1.5)	87.1 (1.2)	86.4 (1.0)	87.4 (1.5)	+		+	–
At Modal Grade	91.3 (0.6)	94.4 (0.6)	95.7 (0.7)	96.5 (0.5)	96.7 (0.6)	95.9 (0.7)	94.5 (0.8)	+		+	–
Above Modal Grade	98.4 (0.9)	*****(****)	*****(****)	*****(****)	*****(****)	*****(****)	*****(****)				
Region											
Northeast	90.7 (1.4)	91.5 (1.1)	93.5 (1.2)	92.6 (1.8)	91.6 (1.5)	95.4 (1.0)	91.4 (1.7)				
Southeast	78.1 (1.7)	83.6 (2.2)	89.8 (1.7)	91.0 (1.2)	90.7 (1.5)	90.6 (1.3)	90.4 (1.4)	+		+	–
Central	89.9 (1.1)	92.0 (1.3)	91.9 (3.5)	94.6 (1.8)	95.4 (0.8)	94.0 (2.0)	95.8 (1.2)	+		+	
West	83.5 (1.5)	91.3 (1.4)	91.3 (1.6)	91.2 (1.3)	94.1 (1.0)	90.4 (1.3)	90.8 (1.2)	+		+	–
Parents' Education Level											
Less than H.S.	71.6 (1.6)	75.8 (2.4)	79.8 (3.5)	82.4 (2.9)	82.4 (3.1)	81.9 (2.3)	79.0 (3.4)			+	
Graduated H.S.	87.0 (0.8)	88.6 (1.1)	90.7 (1.4)	91.4 (1.1)	89.3 (1.2)	90.6 (1.2)	90.0 (1.5)				
Some Education After H.S.	93.4 (0.9)	94.9 (1.4)	95.9 (0.7)	96.6 (0.8)	98.0 (0.7)	94.8 (1.1)	95.8 (1.0)				
Graduated College	95.0 (0.5)	95.5 (0.7)	95.8 (0.7)	96.4 (0.5)	97.1 (0.5)	96.5 (0.4)	95.6 (0.8)				
Unknown	70.1 (1.9)	77.9 (2.1)	78.1 (3.1)	75.4 (2.9)	79.9 (1.9)	79.9 (2.6)	81.2 (2.2)	+		+	
Type Of School											
Public	84.9 (0.8)	89.2 (0.9)	91.3 (1.0)	91.6 (0.8)	92.7 (0.5)	91.9 (0.6)	91.5 (0.8)	+		+	–
Nonpublic	95.7 (1.0)	95.0 (1.5)	97.3 (1.8)	98.4 (0.8)	96.4 (1.1)	96.5 (1.4)	96.0 (2.1)				
Quartiles											
Upper	99.9 (****)	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)				
Middle two	95.5 (0.3)	98.2 (0.2)	99.4 (0.2)	99.6 (0.2)	99.8 (0.1)	99.8 (0.1)	99.7 (0.1)	+		+	–
Lower	53.0 (1.3)	63.0 (2.0)	67.5 (2.7)	70.1 (2.1)	72.9 (1.5)	71.6 (1.7)	73.0 (2.1)	+		+	–

Standard errors of the estimated percentages appear in parentheses. When no value appears (****), statistical tests involving this value should be interpreted with caution; standard error estimates may not be accurately determined and/or the sampling distribution of the statistic does not match statistical test assumptions (See Procedural Appendix).

* Indicates that the percentage in 1996 is significantly larger (+) or smaller (–) than that in 1977.

‡ Indicates that the percentage in 1996 is significantly larger (+) or smaller (–) than that in 1994.

L Indicates that the positive (+) or negative (–) linear trend is significant.

Q Indicates that the positive (+) or negative (–) quadratic trend is significant.

***** Data are unavailable for this assessment year.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Table A.8

NAEP 1996 Science Long-Term Trend Assessment — Age 13
Percentages of students with science scale scores at or above 250

THE NATION'S REPORT CARD naep

	1977	1982	1986	1990	1992	1994	1996	*	‡	L	Q
TOTAL	48.8 (1.1)	50.9 (1.6)	52.5 (1.6)	56.5 (1.0)	61.3 (1.1)	59.5 (1.1)	57.6 (1.1)	+		+	
Gender											
Male	52.3 (1.3)	56.2 (1.8)	57.3 (2.1)	59.8 (1.3)	62.9 (1.4)	62.0 (1.3)	61.7 (1.4)	+		+	
Female	45.4 (1.2)	46.0 (1.6)	47.7 (1.7)	53.3 (1.4)	59.6 (1.4)	57.1 (1.4)	53.8 (1.5)	+		+	
Race/Ethnicity											
White	56.5 (0.9)	58.3 (1.4)	61.0 (1.7)	66.5 (1.2)	71.1 (1.3)	70.5 (1.1)	68.5 (1.2)	+		+	
Black	14.9 (1.7)	17.1 (1.9)	19.6 (2.8)	24.3 (3.3)	26.2 (2.8)	22.4 (4.3)	25.5 (2.2)	+		+	
Hispanic	18.1 (1.8)	24.1 (5.1)	24.9 (4.3)	30.0 (2.8)	36.5 (2.9)	31.6 (3.3)	30.9 (3.3)	+		+	
Other	35.6 (4.9)	64.8 (7.1)	52.6 (6.6)	47.1 (10.2)	62.0 (3.9)	58.9 (4.7)	50.2 (4.5)	-			
Grade											
Below Modal Grade	26.4 (1.3)	28.3 (2.1)	33.0 (1.9)	39.4 (1.8)	46.3 (1.7)	45.3 (1.8)	47.4 (1.9)	+		+	
At Modal Grade	56.8 (1.1)	59.7 (1.7)	61.9 (1.6)	66.3 (1.2)	70.1 (1.2)	67.6 (1.1)	63.1 (1.4)	+	-	+	-
Above Modal Grade	82.3 (4.0)	***** (****)	***** (****)	***** (****)	***** (****)	***** (****)	***** (****)				
Region											
Northeast	56.1 (2.0)	55.1 (2.7)	59.0 (4.0)	58.1 (2.7)	60.4 (2.8)	66.3 (2.0)	56.6 (3.9)				
Southeast	37.5 (1.6)	40.1 (2.3)	48.6 (3.3)	52.7 (2.7)	57.5 (2.5)	54.6 (3.2)	51.8 (2.6)	+		+	
Central	54.8 (2.0)	54.1 (3.5)	49.5 (6.3)	62.7 (3.1)	66.2 (2.2)	64.1 (3.7)	68.6 (1.9)	+		+	
West	44.5 (2.4)	53.0 (3.3)	53.3 (2.8)	53.2 (2.2)	60.4 (2.2)	54.6 (2.1)	54.7 (1.6)	+		+	
Parents' Education Level											
Less than H.S.	26.0 (1.2)	24.2 (2.1)	28.6 (3.5)	31.1 (2.4)	34.2 (3.3)	34.9 (4.4)	29.2 (4.1)				
Graduated H.S.	46.4 (1.4)	43.1 (2.0)	44.4 (2.0)	47.4 (1.7)	48.6 (2.0)	48.3 (1.8)	49.3 (1.9)				
Some Education After H.S.	61.0 (1.5)	60.3 (2.3)	61.0 (2.4)	65.3 (1.9)	71.3 (1.7)	62.7 (2.1)	63.7 (1.9)				+
Graduated College	67.1 (1.1)	65.6 (1.9)	67.0 (2.1)	70.2 (1.4)	73.2 (1.5)	73.1 (1.4)	68.2 (1.3)				+
Unknown	25.7 (2.1)	28.0 (3.0)	23.9 (2.6)	23.3 (2.3)	31.0 (2.6)	30.3 (3.0)	35.2 (3.0)				
Type Of School											
Public	46.7 (1.2)	49.2 (1.8)	51.9 (1.7)	54.7 (1.2)	60.2 (1.2)	57.8 (1.2)	56.0 (1.3)	+		+	
Nonpublic	68.8 (2.6)	65.8 (4.1)	66.8 (8.2)	72.0 (2.6)	68.9 (3.1)	72.7 (3.2)	70.6 (5.4)				
Quartiles											
Upper	92.0 (0.5)	95.1 (0.6)	97.8 (0.5)	99.1 (0.3)	99.6 (****)	99.5 (****)	99.6 (0.2)	+			
Middle two	49.0 (1.0)	51.8 (1.3)	54.5 (1.9)	61.6 (1.1)	69.4 (1.4)	68.0 (1.6)	67.6 (1.4)	+		+	
Lower	5.3 (0.5)	5.2 (0.8)	3.2 (0.9)	3.9 (0.8)	6.5 (0.8)	6.4 (1.1)	6.8 (1.3)				

Standard errors of the estimated percentages appear in parentheses. When no value appears (****), statistical tests involving this value should be interpreted with caution; standard error estimates may not be accurately determined and/or the sampling distribution of the statistic does not match statistical test assumptions (See Procedural Appendix).

* Indicates that the percentage in 1996 is significantly larger (+) or smaller (–) than that in 1977.

‡ Indicates that the percentage in 1996 is significantly larger (+) or smaller (–) than that in 1994.

L Indicates that the positive (+) or negative (–) linear trend is significant.

Q Indicates that the positive (+) or negative (–) quadratic trend is significant.

***** Data are unavailable for this assessment year.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Table A.9

NAEP 1996 Science Long-Term Trend Assessment — Age 13
Percentages of students with science scale scores at or above 300

THE NATION'S REPORT CARD

	1977	1982	1986	1990	1992	1994	1996	*	‡	L	Q
TOTAL	11.1 (0.5)	9.6 (0.7)	9.1 (0.9)	11.2 (0.6)	12.0 (0.8)	11.8 (0.9)	12.3 (0.7)			+	+
Gender											
Male	13.1 (0.6)	12.6 (1.1)	11.9 (1.3)	14.0 (0.9)	14.2 (1.1)	14.8 (1.1)	15.5 (0.9)			+	
Female	9.0 (0.5)	6.9 (0.7)	6.3 (1.1)	8.5 (0.6)	9.9 (0.8)	8.8 (1.0)	9.2 (0.8)				+
Race/Ethnicity											
White	13.4 (0.5)	11.5 (0.8)	11.3 (1.2)	14.2 (0.8)	15.0 (1.0)	14.8 (1.0)	15.9 (0.8)			+	+
Black	1.2 (0.4)	0.8 (0.3)	1.1 (0.4)	1.5 (0.5)	1.8 (0.8)	2.2 (****)	1.9 (0.9)				
Hispanic	1.8 (0.8)	2.4 (0.9)	1.5 (0.7)	3.3 (0.8)	3.3 (1.3)	2.4 (0.9)	3.2 (1.0)				
Other	5.6 (2.0)	15.9 (3.5)	7.4 (2.8)	9.1 (4.6)	14.0 (2.7)	13.6 (4.5)	9.5 (2.7)				
Grade											
Below Modal Grade	3.3 (0.4)	2.6 (0.4)	3.4 (0.6)	5.1 (0.6)	6.3 (0.8)	7.0 (0.6)	8.0 (1.0)	+		+	+
At Modal Grade	13.7 (0.5)	12.3 (0.9)	11.8 (1.3)	14.7 (0.9)	15.2 (1.0)	14.4 (1.1)	14.3 (0.7)			+	
Above Modal Grade	34.5 (5.0)	*****(****)	*****(****)	*****(****)	*****(****)	*****(****)	*****(****)				
Region											
Northeast	13.8 (1.0)	11.2 (1.3)	12.4 (2.2)	12.6 (1.6)	11.7 (1.4)	13.4 (1.9)	11.9 (1.3)				
Southeast	7.1 (0.7)	5.1 (0.6)	6.5 (1.1)	8.8 (0.9)	11.0 (2.1)	10.0 (1.2)	9.7 (1.7)			+	
Central	13.2 (1.0)	10.7 (1.4)	7.4 (1.6)	13.3 (1.4)	13.6 (1.3)	13.9 (1.9)	16.5 (1.4)			+	+
West	9.4 (0.8)	10.9 (1.6)	10.2 (1.7)	10.4 (1.3)	11.7 (1.1)	10.1 (1.3)	11.4 (1.3)				
Parents' Education Level											
Less than H.S.	2.9 (0.4)	1.8 (0.8)	1.9 (1.1)	2.5 (0.8)	1.7 (0.8)	2.7 (1.2)	3.0 (1.3)				
Graduated H.S.	8.4 (0.6)	4.9 (0.7)	4.5 (1.0)	6.3 (1.0)	6.3 (0.8)	5.6 (1.0)	6.1 (1.0)				
Some Education After H.S.	15.7 (1.1)	12.4 (1.6)	9.5 (1.3)	12.8 (1.1)	13.0 (1.4)	12.3 (2.2)	11.5 (1.0)	-			
Graduated College	19.6 (0.9)	15.7 (1.3)	15.7 (2.0)	17.4 (1.1)	17.7 (1.3)	17.9 (1.4)	18.4 (1.2)				
Unknown	3.1 (0.4)	2.6 (0.8)	2.2 (0.9)	1.7 (0.7)	3.3 (0.9)	1.7 (0.7)	5.4 (1.5)				
Type Of School											
Public	10.2 (0.5)	8.9 (0.8)	8.9 (0.9)	10.7 (0.7)	11.9 (0.9)	11.3 (0.9)	11.5 (0.8)			+	
Nonpublic	19.6 (1.9)	16.0 (2.4)	12.8 (3.6)	16.2 (1.5)	13.2 (2.0)	15.5 (2.6)	18.2 (3.0)				
Quartiles											
Upper	36.5 (0.8)	33.8 (2.0)	34.2 (3.2)	41.6 (1.5)	43.9 (2.8)	44.1 (2.3)	46.6 (1.9)	+		+	+
Middle two	3.9 (0.4)	2.4 (0.4)	1.1 (0.3)	1.6 (0.4)	2.1 (0.5)	1.8 (0.4)	2.0 (0.4)	-		-	+
Lower	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)				

Standard errors of the estimated percentages appear in parentheses. When no value appears (****), statistical tests involving this value should be interpreted with caution; standard error estimates may not be accurately determined and/or the sampling distribution of the statistic does not match statistical test assumptions (See Procedural Appendix).

* Indicates that the percentage in 1996 is significantly larger (+) or smaller (–) than that in 1977.

‡ Indicates that the percentage in 1996 is significantly larger (+) or smaller (–) than that in 1994.

L Indicates that the positive (+) or negative (–) linear trend is significant.

Q Indicates that the positive (+) or negative (–) quadratic trend is significant.

***** Data are unavailable for this assessment year.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Table A.10

NAEP 1996 Science Long-Term Trend Assessment — Age 13
Percentages of students with science scale scores at or above 350

THE NATION'S REPORT CARD naep

	1977	1982	1986	1990	1992	1994	1996	*	‡	L	Q
TOTAL	0.7 (0.1)	0.4 (0.1)	0.2 (0.1)	0.4 (0.1)	0.2 (0.1)	0.2 (0.1)	0.4 (0.2)				
Gender											
Male	0.9 (0.2)	0.5 (0.2)	0.3 (0.2)	0.6 (0.2)	0.3 (0.1)	0.3 (0.2)	0.7 (0.2)				
Female	0.4 (0.1)	0.2 (0.1)	0.1 (0.1)	0.2 (****)	0.2 (****)	0.1 (****)	0.2 (****)				
Race/Ethnicity											
White	0.8 (0.1)	0.4 (0.1)	0.3 (0.1)	0.5 (0.1)	0.3 (0.1)	0.3 (0.1)	0.6 (0.2)				
Black	0.0 (****)	0.0 (****)	0.0 (****)	0.1 (****)	0.0 (****)	0.0 (****)	0.0 (****)				
Hispanic	0.0 (****)	0.0 (****)	0.0 (****)	0.1 (****)	0.0 (****)	0.0 (****)	0.0 (****)				
Other	0.1 (****)	0.8 (****)	0.2 (****)	0.7 (****)	0.6 (****)	0.1 (****)	0.4 (****)				
Grade											
Below Modal Grade	0.1 (****)	0.1 (****)	0.0 (****)	0.1 (****)	0.0 (****)	0.1 (****)	0.2 (0.1)				
At Modal Grade	0.8 (0.1)	0.5 (0.2)	0.3 (0.1)	0.5 (0.2)	0.3 (0.1)	0.2 (0.1)	0.5 (0.2)				
Above Modal Grade	4.4 (1.9)	*****(****)	*****(****)	*****(****)	*****(****)	*****(****)	*****(****)				
Region											
Northeast	0.9 (0.3)	0.5 (0.2)	0.5 (0.3)	0.4 (0.2)	0.2 (****)	0.2 (****)	0.6 (****)				
Southeast	0.3 (0.1)	0.1 (****)	0.1 (****)	0.4 (0.2)	0.2 (****)	0.2 (****)	0.3 (****)				
Central	1.0 (0.3)	0.4 (****)	0.1 (****)	0.5 (0.3)	0.3 (****)	0.3 (****)	0.6 (0.2)				
West	0.4 (0.1)	0.4 (0.3)	0.2 (****)	0.3 (****)	0.2 (0.1)	0.1 (****)	0.3 (****)				
Parents' Education Level											
Less than H.S.	0.1 (0.1)	0.0 (****)	0.0 (****)	0.1 (****)	0.0 (****)	0.0 (****)	0.0 (****)				
Graduated H.S.	0.3 (0.1)	0.1 (****)	0.0 (****)	0.1 (****)	0.0 (****)	0.0 (****)	0.0 (****)				
Some Education After H.S.	1.0 (0.2)	0.4 (****)	0.1 (****)	0.3 (****)	0.3 (****)	0.3 (****)	0.2 (****)				
Graduated College	1.4 (0.3)	0.7 (0.2)	0.5 (0.2)	0.8 (0.3)	0.4 (0.2)	0.3 (0.1)	0.8 (0.4)				
Unknown	0.1 (0.1)	0.0 (****)	0.0 (****)	0.0 (****)	0.1 (0.1)	0.0 (****)	0.1 (****)				
Type Of School											
Public	0.6 (0.1)	0.3 (0.1)	0.2 (0.1)	0.4 (0.1)	0.3 (0.1)	0.2 (0.1)	0.4 (0.2)				
Nonpublic	1.6 (0.3)	0.8 (0.5)	0.3 (****)	0.5 (****)	0.1 (****)	0.1 (****)	1.0 (****)				
Quartiles											
Upper	2.6 (0.4)	1.4 (0.4)	0.9 (0.4)	1.6 (0.4)	0.9 (0.4)	0.8 (0.4)	1.7 (0.7)				
Middle two	0.0 (0.0)	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)				
Lower	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)				

Standard errors of the estimated percentages appear in parentheses. When no value appears (****), statistical tests involving this value should be interpreted with caution; standard error estimates may not be accurately determined and/or the sampling distribution of the statistic does not match statistical test assumptions (See Procedural Appendix).

* Indicates that the percentage in 1996 is significantly larger (+) or smaller (–) than that in 1977.

‡ Indicates that the percentage in 1996 is significantly larger (+) or smaller (–) than that in 1994.

L Indicates that the positive (+) or negative (–) linear trend is significant.

Q Indicates that the positive (+) or negative (–) quadratic trend is significant.

***** Data are unavailable for this assessment year.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Table A.11

NAEP 1996 Science Long-Term Trend Assessment — Age 17
Percentages of students with science scale scores at or above 150

THE NATION'S REPORT CARD

	1977	1982	1986	1990	1992	1994	1996	*	‡	L	Q
TOTAL	99.8 (0.0)	99.7 (0.1)	99.9 (****)	99.9 (****)	100.0 (****)	99.8 (0.1)	100.0 (****)				
Gender											
Male	99.9 (0.0)	99.8 (0.1)	99.9 (****)	99.9 (****)	99.9 (****)	99.8 (****)	99.9 (****)				
Female	99.7 (0.1)	99.6 (0.1)	99.9 (****)	99.9 (****)	100.0 (****)	99.9 (****)	100.0 (****)				
Race/Ethnicity											
White	100.0 (0.0)	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)				
Black	98.5 (0.3)	97.9 (0.5)	99.7 (****)	99.4 (****)	99.8 (****)	99.6 (****)	99.9 (****)				
Hispanic	99.7 (0.2)	98.9 (****)	99.8 (****)	99.6 (****)	100.0 (****)	99.3 (****)	99.8 (****)				
Other	99.9 (****)	99.8 (****)	99.2 (****)	99.9 (****)	99.9 (****)	99.0 (****)	100.0 (****)				
Grade											
Below Modal Grade	98.9 (0.3)	98.6 (0.4)	99.6 (****)	99.4 (****)	99.8 (****)	99.5 (0.3)	99.8 (****)				
At Modal Grade	100.0 (0.0)	99.9 (0.1)	100.0 (****)	100.0 (****)	100.0 (****)	99.9 (****)	100.0 (****)				
Above Modal Grade	99.9 (0.0)	99.8 (****)	100.0 (****)	100.0 (****)	100.0 (****)	99.7 (****)	100.0 (****)				
Region											
Northeast	99.9 (****)	99.6 (0.2)	99.9 (****)	99.8 (****)	100.0 (****)	99.7 (0.2)	100.0 (****)				
Southeast	99.5 (0.2)	99.5 (0.3)	99.9 (****)	99.9 (****)	99.9 (****)	99.9 (****)	99.9 (****)				
Central	99.9 (0.0)	99.8 (****)	100.0 (****)	99.9 (****)	100.0 (****)	99.8 (****)	100.0 (****)				
West	99.9 (0.0)	99.7 (0.2)	99.8 (****)	99.9 (****)	100.0 (****)	99.8 (****)	99.9 (****)				
Parents' Education Level											
Less than H.S.	99.5 (0.2)	99.1 (0.4)	99.6 (****)	99.5 (****)	99.9 (****)	99.4 (****)	99.8 (****)				
Graduated H.S.	99.9 (0.0)	99.6 (0.2)	99.9 (****)	99.9 (****)	99.9 (****)	99.8 (****)	99.9 (****)				
Some Education After H.S.	100.0 (****)	99.9 (****)	100.0 (****)	100.0 (****)	100.0 (****)	99.9 (****)	100.0 (****)				
Graduated College	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)				
Unknown	98.4 (0.6)	98.3 (1.1)	98.7 (****)	98.6 (****)	99.9 (****)	98.4 (****)	100.0 (****)				
Type Of School											
Public	99.8 (0.0)	99.6 (0.1)	99.9 (****)	99.8 (****)	100.0 (****)	99.8 (0.1)	99.9 (****)				
Nonpublic	100.0 (****)	99.9 (****)	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)				
Quartiles											
Upper	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)				
Middle two	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)				
Lower	99.2 (0.2)	98.7 (0.3)	99.6 (****)	99.4 (****)	99.8 (****)	99.3 (0.4)	99.8 (****)				

Standard errors of the estimated percentages appear in parentheses. When no value appears (****), statistical tests involving this value should be interpreted with caution; standard error estimates may not be accurately determined and/or the sampling distribution of the statistic does not match statistical test assumptions (See Procedural Appendix).

* Indicates that the percentage in 1996 is significantly larger (+) or smaller (–) than that in 1977.

‡ Indicates that the percentage in 1996 is significantly larger (+) or smaller (–) than that in 1994.

L Indicates that the positive (+) or negative (–) linear trend is significant.

Q Indicates that the positive (+) or negative (–) quadratic trend is significant.

***** Data are unavailable for this assessment year.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Table A.12

NAEP 1996 Science Long-Term Trend Assessment — Age 17
Percentages of students with science scale scores at or above 200

THE NATION'S REPORT CARD naep

	1977	1982	1986	1990	1992	1994	1996	*	‡	L	Q
TOTAL	97.1 (0.2)	95.7 (0.5)	97.1 (0.5)	96.7 (0.3)	97.8 (0.5)	97.1 (0.7)	97.8 (0.3)			+	+
Gender											
Male	97.8 (0.2)	96.8 (0.5)	97.4 (0.7)	96.8 (0.5)	98.0 (0.6)	97.1 (0.6)	97.5 (0.5)				
Female	96.4 (0.3)	94.6 (0.8)	96.9 (0.5)	96.6 (0.6)	97.5 (0.7)	97.2 (1.0)	98.1 (0.4)	+		+	
Race/Ethnicity											
White	99.2 (0.1)	98.6 (0.2)	98.8 (0.3)	99.0 (0.2)	99.3 (0.3)	99.3 (0.3)	99.3 (0.3)				
Black	83.6 (1.3)	79.7 (1.9)	90.9 (2.1)	88.3 (1.9)	92.1 (1.8)	91.1 (1.9)	93.0 (1.2)	+		+	
Hispanic	93.1 (1.7)	86.9 (2.9)	93.3 (2.4)	91.9 (2.2)	94.6 (2.6)	89.9 (3.3)	94.1 (1.6)				
Other	97.1 (1.8)	95.1 (2.2)	89.3 (4.8)	96.3 (1.6)	95.1 (2.6)	95.8 (2.8)	98.3 (1.0)				
Grade											
Below Modal Grade	88.4 (1.1)	85.6 (1.6)	90.7 (2.1)	89.9 (1.6)	92.9 (1.3)	90.7 (1.8)	94.0 (1.1)	+		+	
At Modal Grade	98.5 (0.1)	97.5 (0.4)	98.5 (0.3)	98.6 (0.2)	99.3 (0.3)	98.8 (0.5)	99.0 (0.4)			+	
Above Modal Grade	99.0 (0.3)	97.3 (1.2)	98.0 (****)	98.8 (****)	98.7 (0.7)	98.2 (0.9)	98.7 (****)				
Region											
Northeast	98.0 (0.4)	95.7 (0.9)	97.1 (1.5)	96.4 (1.1)	98.3 (0.6)	97.1 (1.1)	97.3 (1.0)				
Southeast	94.2 (0.7)	93.9 (1.5)	96.6 (1.2)	95.8 (0.6)	96.6 (1.0)	97.0 (1.1)	97.6 (0.9)	+		+	
Central	98.0 (0.3)	97.4 (0.7)	98.4 (0.5)	97.8 (0.7)	98.6 (0.8)	97.9 (0.9)	99.3 (****)				
West	97.3 (0.3)	95.0 (0.9)	96.3 (0.9)	96.7 (0.6)	97.6 (0.9)	96.3 (1.6)	97.2 (0.5)				
Parents' Education Level											
Less than H.S.	93.1 (0.8)	90.1 (1.6)	91.7 (2.3)	91.7 (2.2)	93.1 (3.3)	89.7 (3.1)	92.3 (2.9)				
Graduated H.S.	97.3 (0.3)	95.2 (0.8)	96.7 (0.9)	94.9 (1.0)	96.9 (0.9)	96.2 (1.2)	96.4 (0.8)				
Some Education After H.S.	98.9 (0.2)	98.0 (0.4)	98.6 (0.8)	98.7 (0.5)	98.8 (0.7)	98.4 (0.7)	99.0 (0.4)				
Graduated College	99.5 (0.1)	98.2 (0.3)	99.2 (0.3)	98.7 (0.3)	98.9 (0.5)	99.0 (0.4)	99.0 (0.3)				
Unknown	85.8 (1.6)	85.4 (3.2)	83.9 (5.0)	84.8 (5.0)	90.3 (4.0)	84.3 (4.8)	89.3 (7.0)				
Type Of School											
Public	97.0 (0.2)	95.4 (0.6)	97.0 (0.5)	96.5 (0.4)	97.5 (0.5)	96.8 (0.7)	97.7 (0.4)			+	
Nonpublic	99.5 (0.2)	97.9 (0.7)	99.8 (****)	99.5 (****)	100.0 (****)	99.3 (0.4)	99.0 (****)				
Quartiles											
Upper	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)				
Middle two	99.9 (0.1)	99.7 (0.1)	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)				
Lower	88.7 (0.7)	83.2 (1.6)	88.5 (1.7)	86.8 (1.2)	91.1 (1.7)	87.7 (2.4)	90.7 (1.3)			+	

Standard errors of the estimated percentages appear in parentheses. When no value appears (****), statistical tests involving this value should be interpreted with caution; standard error estimates may not be accurately determined and/or the sampling distribution of the statistic does not match statistical test assumptions (See Procedural Appendix).

* Indicates that the percentage in 1996 is significantly larger (+) or smaller (–) than that in 1977.

‡ Indicates that the percentage in 1996 is significantly larger (+) or smaller (–) than that in 1994.

L Indicates that the positive (+) or negative (–) linear trend is significant.

Q Indicates that the positive (+) or negative (–) quadratic trend is significant.

***** Data are unavailable for this assessment year.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Table A.13

NAEP 1996 Science Long-Term Trend Assessment — Age 17
Percentages of students with science scale scores at or above 250

THE NATION'S REPORT CARD

	1977	1982	1986	1990	1992	1994	1996	*	‡	L	Q
TOTAL	81.6 (0.7)	76.6 (1.0)	80.7 (1.3)	81.2 (0.9)	83.3 (1.2)	83.1 (1.2)	83.8 (0.9)			+	+
Gender											
Male	85.2 (0.7)	81.2 (1.2)	82.4 (1.4)	82.5 (1.2)	85.0 (1.4)	84.9 (1.3)	83.8 (1.1)				
Female	78.0 (1.0)	72.2 (1.3)	79.1 (1.7)	79.9 (1.4)	81.6 (1.4)	81.6 (1.6)	83.7 (1.1)	+		+	+
Race/Ethnicity											
White	88.2 (0.4)	84.9 (0.9)	87.8 (1.4)	89.6 (0.8)	90.5 (1.0)	91.5 (0.9)	91.2 (0.7)	+		+	
Black	40.5 (1.5)	35.0 (2.1)	52.2 (3.2)	51.4 (3.7)	55.7 (3.7)	58.1 (3.7)	59.8 (3.2)	+		+	
Hispanic	61.5 (1.7)	48.0 (2.7)	60.0 (7.2)	59.9 (5.0)	68.3 (6.6)	58.6 (7.4)	67.6 (4.5)				
Other	78.7 (2.9)	65.4 (5.8)	71.0 (7.0)	79.2 (3.8)	78.4 (4.4)	82.7 (5.0)	79.5 (6.0)				
Grade											
Below Modal Grade	53.6 (1.4)	49.9 (2.6)	58.1 (2.8)	59.5 (2.5)	61.0 (3.1)	60.2 (2.9)	67.2 (2.5)	+		+	
At Modal Grade	86.0 (0.6)	81.3 (1.0)	85.2 (1.4)	87.2 (0.8)	90.5 (0.9)	89.1 (0.8)	89.3 (0.8)	+		+	+
Above Modal Grade	88.2 (1.0)	83.0 (2.4)	86.8 (2.6)	86.8 (2.3)	88.7 (2.9)	89.2 (3.1)	84.4 (3.0)				
Region											
Northeast	85.4 (1.6)	77.5 (1.9)	80.8 (3.9)	82.1 (2.8)	85.8 (2.3)	85.5 (2.9)	83.9 (2.4)				
Southeast	72.2 (1.5)	71.2 (2.3)	76.9 (1.9)	76.8 (2.2)	76.1 (2.0)	80.2 (2.4)	78.9 (1.9)			+	
Central	85.1 (1.1)	81.1 (2.3)	85.7 (1.8)	86.9 (2.0)	90.3 (2.2)	85.4 (2.9)	91.1 (1.6)	+		+	
West	79.9 (1.2)	74.8 (2.5)	78.8 (3.0)	79.0 (1.9)	81.7 (3.0)	81.7 (3.0)	81.2 (2.1)				
Parents' Education Level											
Less than H.S.	64.8 (1.5)	58.2 (2.6)	59.8 (3.5)	62.0 (4.3)	61.2 (4.8)	57.0 (5.3)	57.5 (5.5)				
Graduated H.S.	80.0 (1.0)	72.3 (1.5)	74.1 (2.1)	73.4 (1.5)	76.6 (2.5)	75.6 (2.1)	76.4 (2.3)				+
Some Education After H.S.	87.0 (0.8)	83.1 (1.4)	86.8 (1.9)	88.1 (1.6)	87.5 (1.3)	86.6 (1.6)	87.7 (1.3)				
Graduated College	92.9 (0.5)	86.7 (1.4)	89.6 (1.4)	88.9 (1.1)	90.2 (1.3)	92.1 (0.8)	90.1 (1.3)				+
Unknown	52.7 (2.6)	52.1 (4.2)	47.4 (7.9)	48.5 (5.5)	54.1 (7.5)	45.7 (6.7)	53.3 (7.8)				
Type Of School											
Public	80.8 (0.7)	75.8 (1.0)	80.1 (1.4)	80.4 (0.9)	82.0 (1.2)	81.7 (1.3)	83.2 (1.0)			+	+
Nonpublic	92.9 (1.2)	83.5 (2.8)	96.5 (2.2)	90.6 (4.1)	95.5 (2.0)	93.1 (2.3)	90.1 (3.0)				
Quartiles											
Upper	99.7 (0.1)	99.5 (0.2)	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)	100.0 (****)				
Middle two	91.9 (0.4)	88.1 (0.7)	95.8 (0.6)	96.5 (0.6)	97.5 (0.6)	97.2 (0.5)	97.5 (0.9)	+		+	
Lower	42.6 (1.1)	30.5 (1.5)	31.2 (2.4)	31.7 (2.2)	38.2 (3.0)	35.1 (2.3)	36.3 (2.9)				+

Standard errors of the estimated percentages appear in parentheses. When no value appears (****), statistical tests involving this value should be interpreted with caution; standard error estimates may not be accurately determined and/or the sampling distribution of the statistic does not match statistical test assumptions (See Procedural Appendix).

* Indicates that the percentage in 1996 is significantly larger (+) or smaller (–) than that in 1977.

‡ Indicates that the percentage in 1996 is significantly larger (+) or smaller (–) than that in 1994.

L Indicates that the positive (+) or negative (–) linear trend is significant.

Q Indicates that the positive (+) or negative (–) quadratic trend is significant.

**** Data are unavailable for this assessment year.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Table A.14

NAEP 1996 Science Long-Term Trend Assessment — Age 17
Percentages of students with science scale scores at or above 300

THE NATION'S REPORT CARD

	1977	1982	1986	1990	1992	1994	1996	*	‡	L	Q
TOTAL	41.7 (0.9)	37.3 (0.9)	41.3 (1.4)	43.3 (1.3)	46.6 (1.5)	47.5 (1.3)	48.4 (1.3)	-		+	+
Gender											
Male	48.8 (1.1)	45.2 (1.2)	48.8 (2.1)	48.2 (1.6)	50.9 (2.0)	52.9 (1.8)	53.1 (1.5)	+		+	
Female	34.8 (1.0)	29.9 (1.2)	34.1 (1.5)	38.7 (1.7)	42.0 (1.7)	42.4 (1.8)	43.9 (1.7)	+		+	+
Race/Ethnicity											
White	47.5 (0.7)	43.9 (1.1)	48.7 (1.7)	51.2 (1.5)	55.4 (1.7)	57.5 (1.6)	58.5 (1.6)	+		+	+
Black	7.7 (1.0)	6.5 (1.1)	12.5 (2.2)	15.7 (4.0)	14.1 (2.5)	15.4 (2.3)	17.7 (2.7)	+		+	
Hispanic	18.5 (2.1)	11.1 (2.0)	14.8 (2.9)	21.1 (3.3)	23.0 (3.8)	21.7 (4.1)	23.9 (2.5)			+	
Other	36.6 (3.8)	25.2 (4.8)	35.0 (8.1)	45.2 (6.5)	42.9 (6.1)	44.4 (8.0)	46.8 (7.5)				
Grade											
Below Modal Grade	14.5 (0.9)	16.0 (1.8)	17.9 (1.9)	19.6 (1.5)	19.1 (2.2)	22.0 (2.3)	27.3 (2.5)	+		+	
At Modal Grade	45.7 (0.8)	40.7 (1.1)	45.6 (1.7)	50.0 (1.5)	55.2 (1.7)	54.2 (1.4)	55.1 (1.5)	+		+	+
Above Modal Grade	50.5 (1.8)	45.4 (3.2)	50.6 (5.9)	49.2 (3.2)	54.9 (3.4)	52.8 (4.3)	53.8 (5.5)				
Region											
Northeast	47.9 (1.8)	38.3 (1.9)	46.6 (4.0)	45.7 (2.7)	52.0 (2.5)	52.0 (3.6)	48.4 (4.0)				
Southeast	31.6 (1.8)	32.2 (2.2)	37.0 (2.0)	37.5 (2.7)	36.9 (2.8)	40.9 (2.5)	41.2 (2.9)	+		+	
Central	45.0 (1.3)	42.1 (2.2)	45.0 (2.5)	51.7 (3.1)	56.4 (2.6)	51.1 (2.7)	59.0 (3.2)	+		+	
West	38.6 (1.4)	35.0 (2.2)	36.3 (3.5)	38.7 (2.5)	42.2 (3.4)	46.2 (3.5)	45.2 (2.3)			+	
Parents' Education Level											
Less than H.S.	21.6 (1.0)	17.3 (1.7)	14.9 (2.4)	18.2 (2.8)	16.8 (2.5)	14.7 (2.3)	15.6 (3.0)				
Graduated H.S.	35.8 (0.8)	29.5 (1.3)	29.5 (2.0)	30.8 (1.5)	32.1 (2.7)	32.8 (2.4)	36.3 (3.1)				+
Some Education After H.S.	46.0 (1.3)	41.6 (2.1)	46.7 (3.0)	46.7 (1.9)	48.5 (2.1)	47.2 (2.2)	48.8 (2.4)				
Graduated College	59.6 (1.2)	52.5 (1.9)	55.3 (2.4)	57.3 (2.0)	60.0 (1.7)	62.6 (1.9)	59.5 (1.6)				+
Unknown	16.6 (2.3)	15.5 (2.9)	11.4 (4.4)	13.5 (3.9)	18.3 (5.9)	14.4 (4.1)	21.2 (4.8)				
Type Of School											
Public	40.5 (0.8)	36.6 (0.9)	39.9 (1.5)	42.0 (1.3)	44.8 (1.5)	45.3 (1.1)	47.7 (1.3)	+		+	+
Nonpublic	58.9 (2.8)	44.2 (2.6)	74.6 (10.9)	59.8 (6.7)	63.1 (5.3)	62.7 (5.2)	56.3 (7.0)				
Quartiles											
Upper	86.6 (0.9)	82.8 (1.3)	96.7 (1.0)	98.4 (0.5)	99.4 (0.3)	99.6 (****)	99.1 (0.5)	+			
Middle two	38.2 (0.9)	32.5 (1.1)	34.1 (1.2)	37.3 (1.6)	43.2 (2.3)	44.6 (1.3)	45.2 (1.5)	+		+	+
Lower	3.8 (0.4)	1.7 (0.3)	0.3 (****)	0.4 (****)	0.5 (0.3)	0.4 (****)	0.4 (****)				

Standard errors of the estimated percentages appear in parentheses. When no value appears (****), statistical tests involving this value should be interpreted with caution; standard error estimates may not be accurately determined and/or the sampling distribution of the statistic does not match statistical test assumptions (See Procedural Appendix).

* Indicates that the percentage in 1996 is significantly larger (+) or smaller (–) than that in 1977.

‡ Indicates that the percentage in 1996 is significantly larger (+) or smaller (–) than that in 1994.

L Indicates that the positive (+) or negative (–) linear trend is significant.

Q Indicates that the positive (+) or negative (–) quadratic trend is significant.

***** Data are unavailable for this assessment year.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Table A.15

NAEP 1996 Science Long-Term Trend Assessment — Age 17
Percentages of students with science scale scores at or above 350

THE NATION'S REPORT CARD

	1977	1982	1986	1990	1992	1994	1996	*	‡	L	Q
TOTAL	8.5 (0.4)	7.1 (0.4)	7.9 (0.7)	9.2 (0.5)	10.1 (0.7)	10.0 (0.8)	10.8 (1.0)			+	+
Gender											
Male	11.8 (0.6)	10.4 (0.8)	11.4 (1.3)	13.0 (0.8)	13.6 (1.0)	13.8 (1.2)	14.2 (1.4)			+	
Female	5.3 (0.4)	3.9 (0.4)	4.5 (0.8)	5.5 (0.5)	6.6 (1.0)	6.4 (0.6)	7.4 (1.0)			+	
Race/Ethnicity											
White	10.0 (0.4)	8.6 (0.6)	9.6 (0.9)	11.4 (0.7)	12.8 (0.9)	13.2 (1.1)	13.8 (1.4)			+	
Black	0.4 (0.2)	0.2 (0.2)	0.9 (0.6)	1.5 (0.8)	0.8 (****)	0.5 (0.3)	0.8 (0.5)				
Hispanic	1.8 (0.6)	1.4 (0.9)	1.1 (0.7)	2.1 (****)	2.5 (1.2)	1.5 (0.7)	3.0 (1.4)				
Other	6.3 (2.2)	2.8 (1.9)	8.6 (****)	11.6 (4.1)	10.2 (2.8)	7.3 (2.8)	12.9 (4.3)				
Grade											
Below Modal Grade	1.3 (0.3)	2.0 (0.6)	2.0 (0.9)	2.6 (0.8)	2.4 (0.7)	3.2 (0.9)	3.4 (1.2)				
At Modal Grade	9.3 (0.4)	7.8 (0.6)	8.7 (0.9)	10.9 (0.6)	12.3 (0.8)	11.7 (1.0)	12.9 (1.4)			+	
Above Modal Grade	12.6 (1.0)	9.6 (1.0)	12.1 (3.2)	12.1 (3.0)	16.0 (4.0)	13.4 (3.4)	14.2 (2.7)				
Region											
Northeast	10.8 (0.9)	7.6 (0.9)	10.8 (1.9)	10.2 (1.1)	12.9 (1.9)	13.2 (2.2)	11.0 (2.1)				
Southeast	5.2 (0.7)	5.7 (0.9)	6.0 (1.2)	6.7 (1.0)	6.2 (0.7)	6.8 (1.4)	7.9 (1.5)				
Central	9.6 (0.6)	7.9 (1.2)	8.7 (1.7)	12.5 (1.2)	13.1 (1.4)	11.0 (1.5)	14.6 (2.1)			+	
West	7.2 (0.8)	6.7 (0.8)	5.9 (1.7)	7.4 (1.1)	8.9 (1.9)	9.4 (2.2)	9.6 (1.4)				
Parents' Education Level											
Less than H.S.	2.2 (0.3)	1.9 (0.6)	0.7 (****)	1.3 (0.7)	1.6 (0.6)	0.9 (****)	2.1 (****)				
Graduated H.S.	5.7 (0.3)	3.9 (0.7)	3.7 (0.8)	3.8 (0.8)	4.8 (1.2)	3.6 (1.0)	5.2 (1.4)				
Some Education After H.S.	8.7 (0.8)	7.4 (1.2)	8.0 (1.4)	8.8 (0.9)	7.8 (1.0)	7.2 (0.9)	8.1 (1.5)				
Graduated College	15.7 (0.8)	12.4 (0.8)	13.2 (1.4)	15.3 (0.9)	16.3 (1.2)	16.7 (1.5)	16.4 (1.5)				
Unknown	1.7 (0.6)	1.8 (1.0)	1.0 (****)	0.8 (****)	2.4 (****)	2.4 (****)	1.3 (****)				
Type Of School											
Public	8.1 (0.4)	6.9 (0.4)	7.2 (0.7)	8.7 (0.5)	9.6 (0.8)	9.4 (0.5)	10.5 (1.1)			+	+
Nonpublic	14.8 (1.9)	8.5 (2.3)	23.1 (7.7)	15.8 (3.2)	14.1 (2.7)	14.8 (4.0)	13.0 (3.1)				
Quartiles											
Upper	29.2 (1.1)	24.5 (1.4)	31.1 (2.0)	36.3 (1.5)	39.7 (2.0)	40.2 (2.0)	41.2 (3.5)	+		+	
Middle two	2.4 (0.2)	1.9 (0.2)	0.2 (0.1)	0.2 (****)	0.5 (0.3)	0.5 (0.2)	0.5 (0.2)	–			
Lower	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)	0.0 (****)				

Standard errors of the estimated percentages appear in parentheses. When no value appears (****), statistical tests involving this value should be interpreted with caution; standard error estimates may not be accurately determined and/or the sampling distribution of the statistic does not match statistical test assumptions (See Procedural Appendix).

* Indicates that the percentage in 1996 is significantly larger (+) or smaller (–) than that in 1977.

‡ Indicates that the percentage in 1996 is significantly larger (+) or smaller (–) than that in 1994.

L Indicates that the positive (+) or negative (–) linear trend is significant.

Q Indicates that the positive (+) or negative (–) quadratic trend is significant.

***** Data are unavailable for this assessment year.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Table A.16

NAEP 1996 Long-Term Trend Science Results — Age 9

Scale Score Means, Standard Deviations, and Percentiles

THE NATION'S REPORT CARD

	1977	1982	1986	1990	1992	1994	1996
TOTAL SAMPLE							
Mean	219.9 (1.2)	220.8 (1.8)	224.3 (1.2)	228.7 (0.8)	230.6 (1.0)	231.0 (1.2)	229.7 (1.2)
Standard Deviation	44.9 (0.6)	40.9 (1.4)	41.6 (0.6)	40.2 (0.4)	39.9 (0.7)	40.9 (0.5)	42.1 (0.6)
Percentiles							
5	143.8 (2.3)	150.9 (4.9)	155.0 (1.3)	159.8 (1.3)	162.8 (2.0)	161.1 (1.7)	158.9 (1.5)
10	160.9 (2.1)	166.8 (2.6)	169.9 (1.8)	176.1 (1.1)	177.8 (1.8)	177.0 (1.7)	174.2 (1.8)
25	190.1 (1.6)	194.4 (2.2)	195.9 (1.3)	202.0 (1.4)	203.8 (1.6)	203.4 (1.6)	201.4 (1.3)
50	221.5 (1.1)	221.4 (2.4)	225.1 (1.7)	230.3 (0.9)	232.1 (0.9)	233.2 (1.9)	230.9 (1.6)
75	251.0 (1.1)	249.0 (2.0)	253.1 (1.7)	256.6 (0.8)	258.4 (1.0)	259.6 (1.1)	259.0 (1.9)
90	276.5 (1.2)	272.4 (3.9)	276.9 (2.0)	278.8 (1.3)	280.6 (1.6)	281.5 (0.9)	283.2 (1.4)
95	291.4 (1.2)	286.4 (3.7)	290.9 (1.9)	292.1 (1.4)	293.6 (1.4)	295.1 (1.4)	297.6 (1.7)
MALE STUDENTS							
Mean	222.1 (1.3)	221.0 (2.3)	227.3 (1.4)	230.3 (1.1)	234.7 (1.2)	232.2 (1.3)	231.5 (1.7)
Standard Deviation	45.0 (0.7)	42.0 (2.0)	41.9 (0.7)	41.9 (0.6)	40.7 (1.0)	41.8 (0.7)	42.8 (0.7)
Percentiles							
5	146.8 (2.6)	150.4 (5.5)	158.0 (3.6)	159.6 (2.2)	164.7 (3.0)	161.1 (3.9)	159.5 (2.1)
10	163.2 (1.9)	166.5 (3.8)	172.9 (1.8)	176.3 (2.3)	180.9 (2.7)	176.9 (2.1)	175.8 (2.0)
25	191.9 (1.9)	193.5 (4.1)	198.7 (1.8)	202.1 (2.5)	207.2 (1.9)	203.7 (1.5)	202.4 (2.2)
50	223.6 (1.4)	221.3 (3.6)	227.9 (1.7)	231.6 (1.9)	236.2 (1.5)	234.1 (1.6)	231.9 (2.5)
75	253.4 (1.4)	250.4 (3.1)	256.1 (1.9)	259.4 (1.0)	263.1 (1.5)	261.8 (1.1)	261.6 (2.3)
90	279.1 (1.3)	274.7 (4.3)	280.3 (2.0)	283.3 (1.8)	285.8 (1.5)	284.4 (1.7)	286.3 (2.1)
95	294.2 (1.5)	287.1 (5.3)	294.8 (2.7)	296.3 (2.4)	298.6 (1.5)	298.3 (2.3)	300.7 (2.6)
FEMALE STUDENTS							
Mean	217.6 (1.2)	220.7 (2.0)	221.3 (1.4)	227.1 (1.0)	226.7 (1.0)	230.0 (1.4)	228.0 (1.5)
Standard Deviation	44.6 (0.8)	39.8 (1.3)	41.1 (0.8)	38.4 (0.5)	38.8 (0.6)	39.9 (0.7)	41.3 (1.0)
Percentiles							
5	141.3 (3.5)	151.2 (6.6)	152.5 (2.5)	159.9 (2.4)	161.0 (3.4)	161.8 (3.1)	157.9 (4.3)
10	158.5 (2.2)	167.5 (3.1)	166.9 (2.6)	175.8 (2.2)	175.3 (2.2)	177.2 (2.9)	172.6 (2.1)
25	188.3 (1.4)	195.3 (2.6)	193.2 (1.8)	201.9 (1.2)	200.9 (1.5)	203.1 (1.9)	200.5 (1.5)
50	219.5 (1.2)	221.4 (3.6)	222.5 (2.0)	229.2 (1.1)	228.5 (1.4)	232.5 (2.5)	229.8 (1.9)
75	248.6 (1.1)	247.4 (2.4)	250.2 (1.9)	254.0 (1.1)	253.7 (1.5)	257.7 (1.2)	256.7 (2.2)
90	273.8 (1.6)	270.6 (3.4)	273.3 (1.6)	274.6 (1.9)	275.0 (1.7)	279.2 (1.7)	279.4 (2.3)
95	288.2 (1.6)	284.4 (3.3)	287.0 (2.6)	287.0 (1.9)	287.7 (1.2)	291.6 (1.2)	293.7 (3.2)

The standard errors of the estimated scale scores appear in parentheses.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Table A.16
(continued)

NAEP 1996 Long-Term Trend Science Results — Age 9

Scale Score Means, Standard Deviations, and Percentiles

	1977	1982	1986	1990	1992	1994	1996
WHITE STUDENTS							
Mean	229.6 (0.9)	229.0 (1.9)	231.9 (1.2)	237.5 (0.8)	239.1 (1.0)	240.3 (1.3)	239.0 (1.4)
Standard Deviation	40.0 (0.5)	37.6 (1.3)	39.2 (0.7)	36.3 (0.4)	36.4 (0.5)	37.1 (0.6)	39.6 (0.7)
Percentiles							
5	163.2 (1.3)	167.0 (3.0)	166.5 (2.3)	176.9 (1.4)	178.0 (2.0)	177.2 (2.3)	172.1 (2.5)
10	177.6 (1.1)	182.2 (3.1)	181.0 (1.5)	189.9 (1.3)	191.7 (1.5)	191.3 (1.8)	187.2 (1.7)
25	202.4 (1.1)	203.8 (2.6)	205.5 (1.5)	212.6 (0.8)	214.5 (1.3)	215.3 (1.2)	212.4 (1.5)
50	229.8 (0.9)	228.6 (2.4)	232.5 (1.6)	238.3 (1.0)	240.0 (1.1)	241.8 (1.4)	239.7 (1.4)
75	256.9 (0.8)	254.9 (2.0)	258.8 (1.4)	262.3 (1.0)	264.2 (1.3)	265.7 (1.5)	266.3 (1.8)
90	281.1 (1.1)	277.6 (2.8)	281.7 (1.7)	283.5 (1.4)	285.1 (1.6)	286.5 (1.0)	289.0 (2.9)
95	295.4 (1.9)	290.8 (4.0)	294.9 (2.5)	295.7 (1.3)	297.5 (0.8)	299.6 (2.6)	302.9 (1.5)
BLACK STUDENTS							
Mean	174.8 (1.8)	187.0 (3.0)	196.2 (1.9)	196.4 (2.0)	200.3 (2.7)	201.4 (1.7)	201.9 (3.0)
Standard Deviation	41.4 (1.0)	37.7 (1.9)	38.3 (1.0)	38.6 (1.0)	37.3 (0.7)	38.2 (1.4)	38.1 (1.0)
Percentiles							
5	107.0 (3.5)	123.6 (11.0)	132.8 (3.2)	131.3 (4.2)	138.0 (4.2)	138.4 (2.7)	139.3 (3.8)
10	122.8 (3.4)	136.7 (8.3)	146.9 (3.5)	145.3 (3.8)	151.6 (4.0)	152.5 (3.2)	152.6 (5.0)
25	146.6 (2.4)	159.2 (4.9)	169.7 (2.6)	169.8 (2.6)	173.7 (3.5)	175.2 (2.8)	175.7 (3.8)
50	173.8 (2.5)	188.2 (5.0)	195.9 (2.2)	196.3 (2.5)	201.1 (3.0)	201.5 (2.3)	202.5 (4.3)
75	202.9 (1.8)	214.4 (3.8)	222.6 (1.5)	224.1 (1.7)	226.3 (3.4)	227.5 (3.3)	228.1 (4.1)
90	229.2 (2.9)	236.4 (4.7)	246.4 (3.7)	246.8 (2.4)	248.4 (3.0)	252.2 (2.4)	251.0 (4.1)
95	244.1 (2.9)	246.5 (3.3)	259.5 (3.5)	260.0 (5.4)	260.5 (4.6)	263.2 (1.6)	263.6 (4.8)
HISPANIC STUDENTS							
Mean	191.9 (2.7)	189.0 (4.2)	199.4 (3.1)	206.2 (2.2)	204.7 (2.8)	201.0 (2.7)	207.1 (2.8)
Standard Deviation	41.2 (1.4)	36.6 (2.3)	38.9 (1.6)	37.0 (1.7)	37.3 (1.4)	38.6 (2.0)	38.1 (1.3)
Percentiles							
5	125.2 (7.0)	127.3 (9.6)	134.1 (10.1)	146.2 (5.5)	143.0 (3.0)	138.7 (9.1)	143.2 (3.8)
10	139.8 (3.3)	141.9 (16.8)	148.1 (5.2)	158.6 (4.3)	156.8 (3.9)	152.0 (4.1)	156.8 (5.7)
25	163.9 (4.3)	161.9 (7.4)	172.6 (3.4)	180.6 (3.7)	179.1 (3.5)	175.5 (3.4)	180.5 (4.1)
50	191.4 (3.6)	190.8 (4.8)	199.8 (6.7)	206.2 (3.7)	204.8 (4.1)	199.7 (2.2)	207.7 (3.9)
75	219.0 (3.2)	215.9 (3.4)	225.6 (4.1)	232.7 (4.1)	230.4 (2.3)	227.3 (4.8)	235.4 (4.4)
90	245.7 (4.9)	236.2 (5.6)	252.1 (5.4)	252.9 (4.4)	253.7 (5.5)	251.2 (6.5)	255.2 (5.2)
95	261.3 (6.4)	246.0 (7.6)	264.9 (6.7)	266.8 (6.9)	264.9 (3.5)	264.4 (4.3)	268.0 (5.1)

The standard errors of the estimated scale scores appear in parentheses.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Table A.17

NAEP 1996 Long-Term Trend Science Results — Age 13

Scale Score Means, Standard Deviations, and Percentiles

THE NATION'S REPORT CARD

	1977	1982	1986	1990	1992	1994	1996
TOTAL SAMPLE							
Mean	247.4 (1.1)	250.1 (1.3)	251.4 (1.4)	255.2 (0.9)	258.0 (0.8)	256.8 (1.0)	256.0 (1.0)
Standard Deviation	43.5 (0.4)	38.6 (0.5)	36.6 (0.6)	37.6 (0.7)	36.9 (0.5)	37.2 (0.7)	38.4 (0.6)
Percentiles							
5	173.7 (1.7)	185.2 (2.2)	188.9 (2.2)	191.4 (2.0)	193.1 (1.5)	191.0 (1.7)	190.9 (2.5)
10	190.6 (1.4)	199.6 (1.8)	203.3 (2.0)	205.9 (1.7)	208.9 (1.3)	206.7 (1.4)	204.9 (1.9)
25	218.4 (1.4)	224.1 (1.1)	227.2 (1.3)	230.0 (1.5)	234.7 (1.3)	232.7 (1.3)	230.3 (1.4)
50	248.6 (1.2)	250.9 (1.3)	252.1 (1.8)	256.4 (1.2)	260.4 (1.0)	259.2 (0.9)	257.5 (1.3)
75	277.5 (0.9)	276.7 (1.5)	276.5 (1.5)	281.1 (0.9)	283.8 (1.0)	283.0 (1.1)	283.0 (1.2)
90	302.4 (0.9)	299.2 (1.6)	298.2 (2.0)	302.4 (1.1)	303.1 (1.2)	303.1 (1.7)	304.2 (1.2)
95	316.9 (1.5)	312.8 (1.3)	310.3 (1.6)	315.1 (1.9)	314.6 (1.4)	314.3 (1.9)	316.7 (2.1)
MALE STUDENTS							
Mean	251.1 (1.3)	255.6 (1.5)	256.1 (1.6)	258.5 (1.1)	260.1 (1.2)	259.4 (1.2)	260.5 (1.0)
Standard Deviation	43.9 (0.5)	38.7 (0.6)	37.4 (1.0)	38.8 (0.8)	38.0 (0.8)	39.0 (0.8)	39.0 (0.7)
Percentiles							
5	176.7 (1.9)	190.2 (2.6)	192.3 (4.2)	191.9 (2.5)	193.4 (2.7)	189.6 (2.5)	194.3 (2.4)
10	193.5 (1.6)	204.4 (1.6)	207.2 (2.5)	207.3 (3.4)	209.4 (2.4)	206.2 (1.6)	208.8 (1.7)
25	221.5 (1.7)	229.5 (1.7)	231.1 (1.6)	232.9 (1.4)	235.8 (1.1)	234.4 (1.4)	233.8 (2.1)
50	252.4 (1.5)	256.7 (1.5)	256.9 (2.0)	260.3 (1.4)	262.7 (1.5)	262.0 (1.6)	262.2 (1.3)
75	281.6 (1.2)	282.6 (1.5)	282.4 (1.4)	285.8 (2.2)	287.0 (1.8)	287.4 (1.9)	288.3 (1.4)
90	306.5 (1.3)	305.0 (1.7)	303.4 (1.6)	307.4 (1.5)	306.4 (1.8)	307.4 (2.3)	309.0 (1.8)
95	321.2 (1.5)	318.3 (2.3)	316.2 (2.2)	320.2 (1.2)	318.1 (1.6)	318.8 (2.2)	321.5 (2.8)
FEMALE STUDENTS							
Mean	243.7 (1.2)	245.0 (1.3)	246.9 (1.5)	251.8 (1.1)	256.0 (1.0)	254.3 (1.2)	251.7 (1.3)
Standard Deviation	42.8 (0.5)	37.9 (0.7)	35.3 (0.6)	36.1 (0.8)	35.7 (0.8)	35.2 (0.8)	37.3 (0.9)
Percentiles							
5	170.8 (1.6)	180.2 (1.9)	186.3 (2.1)	190.6 (2.1)	192.7 (1.6)	192.4 (1.8)	187.9 (2.7)
10	187.7 (1.8)	195.5 (2.3)	200.5 (2.9)	204.8 (1.5)	208.4 (1.4)	207.2 (2.0)	201.8 (2.7)
25	215.5 (1.7)	219.7 (1.4)	223.4 (1.5)	227.8 (1.6)	233.4 (1.3)	231.3 (1.9)	227.2 (2.1)
50	245.0 (1.2)	246.1 (1.7)	248.0 (1.7)	253.1 (1.2)	258.2 (1.4)	256.3 (1.3)	253.6 (2.0)
75	273.0 (1.5)	271.0 (1.9)	271.0 (1.8)	276.8 (1.6)	280.7 (1.9)	278.9 (1.5)	277.3 (1.9)
90	297.7 (1.0)	292.8 (1.5)	291.3 (1.7)	296.8 (1.1)	299.8 (1.1)	297.7 (2.1)	298.3 (1.9)
95	312.1 (2.2)	305.3 (1.8)	304.0 (3.6)	308.6 (1.4)	311.1 (1.7)	308.4 (2.1)	310.8 (1.8)

The standard errors of the estimated scale scores appear in parentheses.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Table A.17
(continued)

NAEP 1996 Long-Term Trend Science Results — Age 13

Scale Score Means, Standard Deviations, and Percentiles

	1977	1982	1986	1990	1992	1994	1996
WHITE STUDENTS							
Mean	256.1 (0.8)	257.3 (1.1)	259.2 (1.4)	264.1 (0.9)	267.1 (1.0)	266.5 (1.0)	265.9 (1.1)
Standard Deviation	39.5 (0.3)	35.7 (0.6)	33.6 (0.8)	33.8 (0.5)	31.8 (0.6)	32.1 (0.8)	34.3 (0.6)
Percentiles							
5	190.8 (0.9)	198.0 (1.7)	203.5 (2.7)	208.6 (1.6)	212.6 (2.2)	211.9 (1.6)	208.3 (2.8)
10	205.2 (1.2)	210.8 (1.7)	215.8 (1.5)	220.4 (1.2)	225.7 (1.6)	225.3 (1.2)	221.4 (1.8)
25	229.3 (1.3)	233.2 (1.2)	237.0 (1.9)	241.3 (0.9)	246.1 (1.1)	245.3 (1.1)	243.0 (1.1)
50	256.3 (0.8)	257.6 (1.3)	259.2 (2.0)	264.5 (1.1)	267.8 (1.1)	267.3 (1.3)	266.6 (1.4)
75	282.9 (0.7)	281.5 (1.1)	282.3 (1.9)	287.0 (1.7)	289.0 (1.2)	288.6 (1.5)	289.3 (1.1)
90	306.6 (0.9)	302.7 (1.6)	302.2 (1.9)	307.1 (1.4)	307.1 (1.6)	307.1 (1.8)	309.3 (1.8)
95	320.8 (1.1)	316.2 (1.7)	313.9 (2.1)	319.4 (1.3)	318.0 (1.4)	317.6 (2.7)	321.4 (2.6)
BLACK STUDENTS							
Mean	208.1 (2.4)	217.1 (1.3)	221.6 (2.5)	225.7 (3.1)	224.4 (2.7)	223.9 (4.2)	225.7 (2.1)
Standard Deviation	39.7 (0.9)	34.6 (1.2)	33.0 (0.9)	34.3 (1.7)	37.1 (1.3)	35.7 (2.6)	35.3 (1.2)
Percentiles							
5	144.3 (3.2)	160.3 (3.1)	167.8 (1.7)	169.7 (5.5)	162.1 (3.7)	167.7 (5.9)	167.5 (5.9)
10	157.7 (2.4)	173.0 (3.1)	180.1 (2.2)	181.8 (6.1)	177.0 (3.8)	179.7 (5.5)	181.2 (4.4)
25	180.5 (2.2)	193.7 (2.4)	198.3 (3.0)	202.3 (3.7)	198.9 (3.6)	198.0 (3.6)	200.9 (2.9)
50	207.4 (2.5)	216.8 (1.3)	221.2 (2.8)	225.7 (3.0)	223.8 (2.4)	222.6 (5.3)	224.5 (2.4)
75	234.8 (2.6)	240.7 (2.2)	243.5 (3.6)	249.1 (2.6)	251.4 (3.6)	246.9 (4.2)	250.6 (3.4)
90	259.5 (3.4)	262.2 (3.5)	264.4 (4.9)	269.0 (4.2)	272.0 (2.7)	271.9 (7.0)	270.8 (2.8)
95	274.6 (2.7)	274.7 (1.9)	276.8 (2.5)	283.2 (3.7)	286.0 (7.6)	286.5 (13.3)	285.7 (3.5)
HISPANIC STUDENTS							
Mean	213.4 (1.9)	225.5 (3.9)	226.1 (3.1)	231.6 (2.6)	237.5 (2.6)	232.1 (2.4)	232.2 (2.5)
Standard Deviation	40.4 (1.2)	36.2 (1.1)	34.2 (1.2)	36.6 (1.0)	34.0 (1.2)	34.9 (1.1)	35.4 (0.8)
Percentiles							
5	147.1 (3.5)	166.3 (4.9)	171.1 (5.6)	173.7 (4.7)	180.3 (3.7)	175.2 (3.1)	174.7 (3.1)
10	161.4 (3.0)	179.4 (4.1)	181.3 (4.5)	185.3 (4.5)	193.0 (6.4)	187.3 (1.8)	186.9 (2.7)
25	185.8 (3.5)	200.7 (3.6)	201.6 (5.5)	205.9 (4.1)	215.2 (3.8)	206.9 (3.3)	208.0 (3.1)
50	213.3 (2.5)	225.9 (4.4)	225.6 (3.8)	230.9 (3.3)	237.9 (4.5)	231.4 (2.7)	231.2 (3.0)
75	240.3 (3.5)	249.3 (5.1)	249.8 (3.4)	256.4 (5.1)	260.9 (3.4)	257.8 (5.0)	256.1 (3.5)
90	265.8 (2.0)	271.2 (5.1)	269.9 (3.5)	280.0 (5.9)	281.8 (2.5)	276.8 (7.1)	279.7 (3.9)
95	282.1 (4.4)	284.8 (6.1)	283.0 (3.8)	294.2 (2.8)	292.1 (4.2)	289.7 (6.8)	292.5 (10.9)

The standard errors of the estimated scale scores appear in parentheses.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Table A.18

NAEP 1996 Long-Term Trend Science Results — Age 17

Scale Score Means, Standard Deviations, and Percentiles

THE NATION'S REPORT CARD naep

	1977	1982	1986	1990	1992	1994	1996
TOTAL SAMPLE							
Mean	289.5 (1.0)	283.3 (1.2)	288.5 (1.4)	290.4 (1.1)	294.1 (1.3)	294.0 (1.6)	295.7 (1.2)
Standard Deviation	45.0 (0.4)	46.7 (0.7)	44.4 (1.0)	46.2 (0.6)	44.7 (0.8)	45.6 (1.1)	45.1 (0.9)
Percentiles							
5	212.6 (1.3)	203.2 (2.2)	211.8 (2.4)	209.9 (2.3)	217.7 (2.1)	212.3 (4.3)	217.5 (2.8)
10	231.3 (1.4)	221.5 (1.9)	229.5 (2.4)	228.8 (2.0)	234.2 (2.5)	232.4 (4.3)	235.1 (1.6)
25	260.6 (1.4)	252.5 (2.1)	259.6 (1.9)	260.3 (1.9)	263.6 (2.3)	264.6 (2.0)	265.8 (2.5)
50	290.8 (1.0)	285.4 (1.0)	290.1 (1.9)	292.2 (1.3)	295.9 (1.5)	297.3 (1.2)	298.1 (1.1)
75	320.1 (0.9)	315.3 (1.6)	319.4 (1.3)	322.7 (1.4)	326.6 (1.3)	326.3 (1.1)	327.1 (2.2)
90	346.2 (1.1)	341.5 (1.1)	344.5 (1.9)	348.3 (1.2)	350.3 (1.9)	350.0 (1.5)	351.7 (2.2)
95	361.5 (1.3)	357.3 (1.4)	359.9 (2.0)	362.9 (1.5)	363.8 (1.2)	363.4 (1.8)	365.1 (3.4)
MALE STUDENTS							
Mean	297.0 (1.2)	291.9 (1.4)	294.9 (1.9)	295.6 (1.3)	299.1 (1.7)	299.5 (2.0)	299.7 (1.6)
Standard Deviation	45.3 (0.6)	47.1 (0.9)	46.6 (1.2)	48.7 (0.9)	46.3 (1.0)	47.3 (1.2)	47.6 (1.1)
Percentiles							
5	219.5 (2.1)	210.3 (2.3)	213.9 (2.8)	210.4 (3.9)	219.0 (3.9)	214.2 (4.7)	215.0 (3.2)
10	238.2 (1.6)	228.9 (2.7)	231.4 (5.0)	229.5 (2.9)	235.5 (4.2)	235.4 (5.7)	233.9 (2.1)
25	267.6 (1.5)	261.1 (1.9)	263.5 (3.0)	263.4 (1.3)	267.4 (3.0)	269.4 (3.3)	268.8 (2.9)
50	298.5 (1.2)	294.3 (1.4)	298.7 (2.8)	297.9 (1.9)	301.3 (2.2)	303.6 (2.2)	303.7 (2.5)
75	328.1 (1.4)	324.8 (2.0)	327.6 (1.6)	329.9 (1.8)	333.6 (1.4)	334.0 (2.2)	333.1 (2.4)
90	353.9 (1.4)	350.6 (1.9)	353.4 (2.8)	356.7 (2.3)	357.2 (1.0)	357.1 (2.8)	358.6 (2.8)
95	368.8 (1.6)	365.3 (1.3)	367.0 (4.6)	372.5 (1.8)	370.4 (1.5)	370.2 (4.7)	373.3 (3.9)
FEMALE STUDENTS							
Mean	282.2 (1.1)	275.2 (1.3)	282.3 (1.5)	285.4 (1.6)	289.0 (1.5)	288.9 (1.7)	291.8 (1.4)
Standard Deviation	43.5 (0.5)	44.8 (0.8)	41.3 (1.1)	43.2 (1.0)	42.3 (1.2)	43.0 (1.3)	42.0 (1.1)
Percentiles							
5	207.5 (1.6)	198.3 (3.6)	209.8 (3.5)	209.2 (3.7)	216.5 (4.2)	211.5 (4.2)	220.0 (2.0)
10	226.1 (2.1)	215.5 (2.6)	228.1 (2.0)	228.2 (4.5)	232.9 (2.8)	230.9 (3.0)	236.3 (1.9)
25	254.5 (1.5)	245.7 (2.1)	256.2 (2.0)	257.7 (2.4)	260.3 (2.4)	261.1 (4.2)	263.5 (2.7)
50	283.8 (1.2)	277.6 (2.0)	283.7 (1.4)	287.7 (2.0)	290.9 (2.1)	292.5 (1.4)	293.5 (3.0)
75	311.5 (1.1)	306.2 (1.2)	310.8 (1.8)	316.2 (2.3)	319.8 (1.9)	318.6 (1.9)	321.8 (2.2)
90	336.3 (1.2)	330.1 (1.0)	333.5 (3.0)	339.6 (2.3)	341.4 (1.9)	341.3 (2.6)	344.4 (2.2)
95	351.2 (1.5)	345.2 (1.5)	348.3 (3.2)	351.5 (1.6)	354.4 (2.2)	355.0 (2.6)	357.2 (3.5)

The standard errors of the estimated scale scores appear in parentheses.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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Table A.18
(continued)

NAEP 1996 Long-Term Trend Science Results — Age 17

Scale Score Means, Standard Deviations, and Percentiles

THE NATION'S REPORT CARD

	1977	1982	1986	1990	1992	1994	1996
WHITE STUDENTS							
Mean	297.7 (0.7)	293.1 (1.0)	297.5 (1.7)	300.9 (1.1)	304.2 (1.3)	306.0 (1.5)	306.8 (1.2)
Standard Deviation	40.5 (0.3)	41.6 (0.5)	40.6 (1.0)	41.1 (0.6)	40.6 (0.9)	39.8 (0.9)	40.4 (1.1)
Percentiles							
5	231.1 (0.9)	223.0 (1.7)	228.3 (2.9)	232.8 (2.3)	234.3 (3.9)	237.7 (4.4)	236.8 (1.5)
10	246.0 (0.7)	239.1 (1.5)	244.5 (3.1)	249.0 (2.0)	251.3 (2.5)	253.9 (3.1)	253.4 (2.2)
25	270.3 (0.8)	265.5 (1.5)	271.0 (2.0)	273.4 (1.5)	276.8 (2.2)	280.5 (1.7)	280.9 (1.5)
50	297.5 (0.7)	293.6 (1.0)	298.7 (1.7)	301.2 (1.2)	306.0 (1.5)	307.6 (1.6)	308.7 (1.3)
75	325.0 (0.9)	321.2 (1.6)	324.9 (1.3)	329.0 (1.6)	333.0 (1.7)	333.8 (1.4)	334.5 (1.8)
90	349.9 (1.0)	346.0 (1.3)	348.9 (3.0)	352.3 (1.3)	355.1 (1.5)	356.1 (2.0)	357.3 (2.6)
95	364.6 (1.4)	360.8 (1.3)	363.5 (2.8)	367.3 (2.0)	368.5 (0.9)	368.8 (4.8)	370.3 (3.4)
BLACK STUDENTS							
Mean	240.2 (1.5)	234.7 (1.7)	252.8 (2.9)	253.0 (4.5)	256.2 (3.2)	256.8 (3.1)	260.3 (2.4)
Standard Deviation	41.6 (0.9)	41.8 (1.3)	40.4 (2.2)	44.7 (2.4)	39.4 (1.4)	40.9 (1.7)	40.9 (1.6)
Percentiles							
5	172.4 (1.5)	166.0 (3.1)	189.3 (4.8)	182.0 (10.1)	191.8 (4.0)	186.2 (5.0)	191.3 (2.1)
10	187.3 (1.9)	180.6 (3.5)	201.6 (4.9)	196.6 (3.1)	206.6 (4.1)	201.9 (3.5)	207.8 (4.3)
25	212.1 (1.4)	206.4 (3.2)	225.0 (4.2)	220.5 (4.3)	230.1 (1.7)	229.1 (5.5)	231.6 (3.2)
50	240.4 (1.8)	234.7 (3.0)	251.9 (5.9)	251.6 (3.0)	255.4 (3.2)	257.9 (3.1)	259.3 (3.2)
75	267.9 (2.0)	262.7 (2.2)	279.5 (3.4)	282.9 (6.0)	282.4 (5.9)	285.1 (5.1)	288.9 (3.4)
90	293.4 (2.6)	288.8 (3.9)	306.0 (4.2)	313.6 (11.3)	308.2 (10.3)	310.4 (3.8)	314.9 (5.7)
95	309.6 (2.6)	305.4 (1.6)	322.8 (5.8)	329.3 (10.2)	324.8 (8.7)	322.1 (4.5)	327.5 (4.4)
HISPANIC STUDENTS							
Mean	262.3 (2.2)	248.7 (2.3)	259.3 (3.8)	261.5 (4.4)	270.2 (5.6)	261.4 (6.7)	269.3 (3.3)
Standard Deviation	41.8 (1.5)	43.4 (2.3)	39.3 (1.7)	44.1 (2.6)	41.6 (2.0)	46.3 (2.0)	43.6 (2.1)
Percentiles							
5	193.7 (5.2)	178.0 (6.1)	194.4 (9.3)	188.7 (6.2)	196.6 (10.5)	186.4 (6.9)	196.6 (6.0)
10	208.4 (4.0)	194.2 (7.2)	209.2 (3.8)	203.9 (11.1)	215.4 (14.6)	199.2 (5.7)	212.3 (8.5)
25	234.3 (3.9)	218.8 (3.3)	232.0 (5.6)	230.6 (3.6)	241.6 (8.6)	226.4 (7.7)	239.9 (6.5)
50	262.4 (2.4)	248.0 (2.5)	258.9 (5.8)	260.5 (5.7)	272.7 (11.0)	262.9 (12.0)	270.6 (3.8)
75	289.5 (5.1)	278.4 (3.4)	285.8 (3.6)	292.6 (10.6)	297.9 (2.8)	295.9 (5.7)	298.4 (7.4)
90	316.9 (4.4)	302.1 (3.4)	309.9 (7.6)	317.4 (5.1)	322.8 (6.7)	321.1 (5.8)	323.1 (2.8)
95	331.3 (4.4)	320.8 (11.0)	324.4 (6.3)	329.5 (9.1)	339.1 (6.0)	335.5 (4.8)	338.5 (4.9)

The standard errors of the estimated scale scores appear in parentheses.
SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

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